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100
YEARS OF
LEADERSHIP
1886-1986

Implement & Tractor

The business magazine of the farm and industrial equipment industry NOVEMBER 1986

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49th Market Statistics Issue

Latest Import-Export Data

Equipment on Farms

Retail Sales Perspective

GLEANER
ALLIS CHALMERS

Representing Case-IH
...and John Deere
page 8

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I&T 100 YEARS OF LEADERSHIP 1886-1986

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

November 1986 • Vol. 101 • No. 13

49th Annual Statistics Issue

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On the cover...photo courtesy of Deutz-Allis Corp.

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September Sales: Normal Softness

The flash report on September U.S. retail sales, from the Farm & Industrial Equipment Institute, indicates that the recent surge in combine sales has eased off. The market profile is back to its normal softness, but with nice improvements in sales of balers, mower-conditioners and smaller-horsepower tractors.

Unit Retail Sales

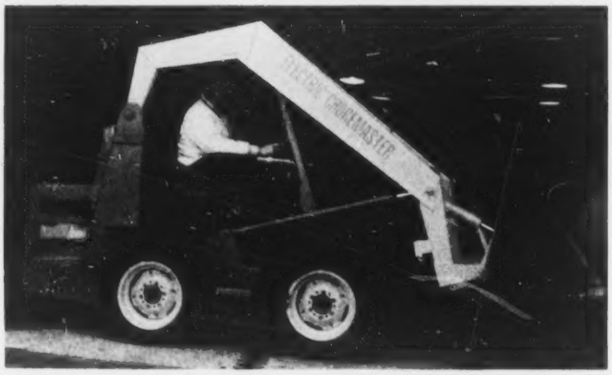
	September			January-September		
	1986	**1985**	**Pct. Change**	**1986**	**1985**	**Pct. Change**
Farm Wheel Tractors:						
2-wheel drive						
Under 40 hp	4,558	4,367	+ 4.4	49,350	46,151	+ 6.9
40-99 hp	2,580	2,513	+ 2.7	23,317	29,438	– 20.8
100-139 hp	255	375	– 32.0	3,863	5,958	– 35.2
Over 140 hp	486	877	– 44.6	7,049	7,989	– 11.8
Total 2-wheel drive	**7,879**	**8,132**	**– 3.1**	**83,579**	**89,536**	**– 6.7**
4-wheel drive						
Under 200 hp	25	66	– 62.1	387	636	– 39.2
Over 200 hp	99	115	– 13.9	942	1,270	– 25.8
Total 4-wheel drive	**124**	**181**	**– 31.5**	**1,329**	**1,906**	**– 30.3**
Total All Tractors	**8,003**	**8,313**	**– 3.7**	**84,908**	**91,442**	**– 7.1**
S-P Combines	951	1,093	– 13.0	5,147	4,908	+ 4.9
Balers (under 200-lb. bales)	565	534	+ 5.8	5,042	6,279	– 19.7
Forage Harvesters (shear-bar type)	391	430	– 9.1	1,507	1,756	– 14.2
Mower-Conditioners	1,121	906	+ 23.7	9,362	9,811	– 4.6

Templeton, Lucas To Major Positions At Deutz-Allis

L. William Templeton has moved from his post as sales vice-president for Kubota Tractor to marketing vice-president for Deutz-Allis Corp. He succeeds Ray Dague, who retires from the position after 41 years with D-A and its predecessor, Allis-Chalmers.

James M. Lucas succeeds Warren Higgins as vice president, combine. Higgins had been with the company 13 years before retiring.

Templeton joined Kubota in 1981 after a 17-year career with Ford Tractor and eight years with a Ford Tractor distributor. Lucas, formerly a vice-president and division manager for Harley-Davidson, also spent 19 years with Ford Motor Co. in manufacturing positions.



The "Skidtric" is a battery-operated skid-steer loader designed and built at the Ag Engineering Dept. of South Dakota State U. Power unit is a 72-volt, 320 A-h battery connected to two DC series wound motors for traction and one DC compound wound motor for hydraulics.

Briefly...

Two European tractor firms, Finland's Valmet and Austria's Steyr, have agreed on a joint development program to produce new tractor models for the 1990s. The program would include design work, component sourcing and eventually joint production, with each firm doing its own marketing.

That trend toward competitiveness in the price of American steel continues. The September survey of the Steel Service Center Institute reported that 72 per cent of respondents said the American product was about equal in price to foreign offerings. The other 28 per cent found foreign steel cheaper by 6 to 10 per cent. A year earlier, the positions were approximately reversed, and the shift began in April of this year.

Locations and dates for future conventions of the National Farm & Power Equipment Dealers Assn.: 1987 – Aug. 2-6, Milwaukee, Wis.; 1988 – Aug. 7-11, Vancouver, B.C.; 1989 – Aug. 6-10 Boston, Mass.; 1990 – Aug. 5-9, Salt Lake City, Utah; 1991 – August, St. Louis, Mo.

Deutz-Allis Will Build Tractors at Independence in '88

A new tractor line to replace its current 8000 series (107 to 170 hp) will be produced by Deutz-Allis in 1988 at its Gleaner plant in Independence, Mo.

According to Roy Uelner, Deutz-Allis president, the tractors produced at Independence will include designs and components sourced both in the U.S. and in West Germany, where Deutz-Allis's parent company, KHD, produces Deutz tractors.

There will be some overlap in the line with the firm's recently introduced 7100 series, which includes four German-made tractors from 85 to 145 pto hp.

Gehl Buys Ag Lines Of Owatonna Mfg.

Gehl Co., West Bend, Wis., manufacturer of haying and livestock feeding equipment, has bought the farm equipment assets of Owatonna Mfg. Co., Owatonna, Minn. The Owatonna ag line includes pull-type and self-propelled mower-conditioners and round balers.

Gehl already produces and markets round balers. Bernard L. Nielsen, Gehl president, explained that while Gehl's models have a variable chamber, Owatonna round balers feature a fixed chamber.

The Owatonna purchase is Gehl's fourth product acquisition in less than a year. The company has bought a line of manure spreaders and manure loading equipment, a line of running gear, and crop residue distributing attachments for grain combines.

Gehl has manufacturing facilities at West Bend and at Madison, S.D.

The U.S. Commerce Dept. is sponsoring a pavilion at Agrotech '87, Bangkok, Thailand, Jan. 17-21. Contact person is Mary R. Wiening, Room H-2124, Dept. of Commerce, Washington D.C. 20230, telephone 202/377-4708.

Motor Vehicles and Specified Machines on U.S. Farms and Average Prices of Wheel Tractors, January 1, Designated Years[1]

Year	Tractors (exclusive of steam & garden)[2] Thousands	Motor Trucks Thousands	Grain Combines Thousands	Corn Pickers and Picker Shellers Thousands	Pick-up Balers Thousands	Field Forage Harvesters Thousands	Garden Tractors and Motor Tillers[3] Thousands	Wheel Tractors Wholesale Prices[4] Per Unit Dollars	Wheel Tractors Wholesale Prices[4] Horsepower Dollars
1964	4,786	2,970	920	705	734	312	513	$ 3,443	$ 53
1965	4,787	3,030	910	690	751	316	699	$ 3,541	$ 56
1966	4,783	3,017	888	686	752	316	725	$ 3,886	$ 58
1967	4,786	3,009	867	680	748	319	750	$ 4,257	$ 62
1968	4,766	3,016	847	673	739	321	770	$ 4,709	$ 66
1969	4,712	3,004	820	657	725	314	790	$ 4,976	$ 71
1970	4,619	2,978	790	635	708	304	805	$ 5,560	$ 76
1971	4,562	2,985	760	629	698	309	815	$ 6,190	$ 80
1972	4,509	2,993	725	625	687	315	825	$ 6,486	$ 84
1973	4,477	3,006	703	618	680	324	835	$ 6,953	$ 85
1974	4,478	3,020	685	618	677	332	850	$ 7,294	$ 86
1975	4,463	3,032	666	615	666	337	870	$ 8,459	$ 91
1976	4,434	3,043	647	610	642	342	890	$11,220	$112
1977	4,381	3,052	630	605	614	346	905	$12,692	$124
1978	4,350	3,054	615	600	595	345	917	$13,431	$144
1979	4,623	3,350	655	596	744	295	927	$16,512	$149
1980	4,598	3,367	653	592	759	293	933	$18,139	$166
1981	4,573	3,385	650	587	774	291	938	$23,308	$199
1982	4,547	3,405	647	582	788	288	942	$25,941	$204
1983	4,520	3,427	644	576	799	285	944	$34,198	$237
1984	4,497	3,449	642	569	810	282	945	$37,434	$261
1985	4,480	3,467	640	561	822	280	942	$40,730	$290
1986	4,470	3,460	637	552	819	278	938	.....	.....

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[1] SOURCE: Reports of the USDA and the Bureau of the Census. On-farm data after 1970, except 1975 and 1979, are estimated by I&T.

[2] Consists of Wheel and Crawler Tractors.

[3] Motor Tillers included after 1964.

[4] Estimated at wholesale level by dividing **Value of Manufacturers' Shipments** by **Units Shipped** and by **Maximum Belt Horsepower,** data are published in "Current Industrial Reports" of the Bureau of the Census. 1986 not available.

Note: Data from the 1978 Census (Jan. 1, 1979 above) and later years, reflect changes in sample coverage and are not fully comparable with earlier years.

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Principal Machines on Farms—1986

STATE	WHEEL TRACTORS 1978 Census Number	WHEEL TRACTORS 1982 Census Number	WHEEL TRACTORS Estimated July 1, 1986 Number	SELF-PROPELLED COMBINES 1978 Census Number	SELF-PROPELLED COMBINES 1982 Census Number	SELF-PROPELLED COMBINES Estimated July 1, 1986 Number	CORN HEADS 1978 Census Number	CORN HEADS 1982 Census Number	CORN HEADS Estimated July 1, 1986 Number
Maine	13,741	13,569	13,370	388	320	278	183	181	175
New Hampshire	4,877	5,097	5,180	14	8	5	64	50	40
Vermont	14,637	15,274	15,480	156	76	62	346	374	380
Massachusetts	9,840	9,956	9,940	26	23	19	113	145	155
Rhode Island	1,462	1,364	1,290	13	6	4	17	13	10
Connecticut	7,865	8,421	8,630	86	53	42	157	98	75
New York	120,215	119,498	118,410	5,775	6,030	6,110	3,401	3,904	4,080
New Jersey	20,655	20,554	20,380	1,086	1,011	950	532	593	600
Pennsylvania	137,998	136,505	134,900	9,674	9,707	9,650	4,409	5,408	5,800
Delaware	8,348	8,012	7,800	1,314	1,342	1,350	1,003	1,006	990
Maryland	36,251	36,951	37,050	3,518	3,279	3,130	2,732	2,840	2,850
NORTHEAST	**375,889**	**375,201**	**372,430**	**22,050**	**21,855**	**21,600**	**12,957**	**14,612**	**15,155**
Ohio	198,865	193,367	189,300	33,449	33,200	32,800	24,438	26,403	26,980
Indiana	176,767	167,563	161,600	37,403	34,646	32,990	32,638	31,391	30,430
Illinois	277,604	262,112	255,510	63,230	61,411	60,130	55,793	55,636	54,700
Iowa	323,132	305,334	295,300	55,586	57,726	58,830	53,030	57,046	58,140
Missouri	198,225	193,758	190,690	33,378	32,957	32,490	23,056	21,834	20,880
CORN BELT	**1,174,593**	**1,122,134**	**1,092,400**	**223,045**	**219,940**	**217,240**	**188,955**	**192,310**	**191,130**
Michigan	148,063	146,655	145,250	18,919	21,060	21,660	11,076	13,583	14,760
Wisconsin	252,594	243,827	238,300	18,262	19,215	19,570	8,458	11,939	13,680
Minnesota	277,920	264,581	256,900	44,841	45,847	46,200	27,197	31,098	32,680
LAKE STATES	**678,577**	**655,063**	**640,450**	**82,022**	**86,122**	**87,430**	**46,731**	**56,620**	**61,120**
North Dakota	120,191	108,103	102,400	30,782	27,546	26,340	1,619	2,708	3,150
South Dakota	111,485	105,699	101,060	16,503	16,961	17,090	7,759	9,606	10,630
Nebraska	175,569	164,308	159,570	35,083	34,032	33,300	24,623	25,484	25,990
Kansas	157,327	149,870	145,730	47,142	46,662	46,115	9,150	8,321	7,480
GREAT PLAINS	**564,572**	**527,980**	**508,760**	**129,510**	**125,201**	**122,845**	**43,151**	**46,119**	**47,250**
West Virginia	24,901	27,110	27,900	479	562	620	265	471	510
Kentucky	157,432	163,176	164,100	10,568	11,466	11,900	8,382	9,924	10,560
Tennessee	120,161	126,365	129,700	10,765	11,227	11,400	5,581	6,508	6,890
Virginia	83,836	88,511	89,500	5,878	6,224	6,350	4,255	5,061	5,300
North Carolina	145,863	131,488	126,400	13,297	13,820	12,400	10,326	10,618	10,550
APPALACHIAN	**532,193**	**536,650**	**537,600**	**40,987**	**42,299**	**42,670**	**28,809**	**32,582**	**33,810**
South Carolina	47,967	44,338	41,700	6,420	6,263	6,100	3,854	3,808	3,730
Georgia	79,031	75,505	72,900	9,589	8,980	8,640	7,302	6,438	5,900
Florida	51,099	52,346	52,500	1,726	1,742	1,720	1,112	1,307	1,370
Alabama	69,438	66,330	64,100	6,660	6,935	7,050	3,383	3,630	3,680
SOUTHEAST	**247,535**	**238,519**	**231,200**	**24,395**	**23,920**	**23,510**	**15,651**	**15,183**	**14,680**
Mississippi	72,483	70,139	68,770	9,911	9,695	9,530	527	861	1,000
Louisiana	58,373	56,883	55,870	9,624	8,468	7,800	377	286	240
Arkansas	84,108	81,556	79,900	13,960	12,891	12,250	292	221	190
DELTA STATES	**214,964**	**208,578**	**204,540**	**33,495**	**31,054**	**29,580**	**1,196**	**1,368**	**1,430**
Oklahoma	99,771	99,934	99,500	17,647	17,299	16,990	822	600	490
Texas	262,886	264,740	264,900	23,026	21,049	19,775	3,628	3,913	3,990
SOUTHERN PLAINS	**362,657**	**364,674**	**364,400**	**40,673**	**38,346**	**36,765**	**4,450**	**4,513**	**4,480**
Montana	54,737	54,666	54,270	13,180	12,038	11,230	101	89	75
Idaho	53,552	50,575	48,900	9,843	9,309	8,940	414	344	325
Wyoming	19,322	20,673	21,150	1,999	1,991	1,970	171	221	245
Colorado	58,331	56,141	54,950	8,404	7,994	7,750	2,397	2,618	2,650
New Mexico	16,601	17,455	17,650	1,513	1,346	1,230	246	308	335
Arizona	11,956	12,262	12,300	509	369	290	60	94	100
Utah	21,145	21,613	21,650	1,743	1,591	1,470	186	225	240
Nevada	5,142	5,160	5,140	263	234	200	3	19	20
MOUNTAIN STATES	**240,786**	**238,545**	**236,010**	**37,454**	**34,872**	**33,080**	**3,578**	**3,918**	**3,990**
Washington	53,301	59,377	61,840	8,431	8,314	8,190	470	558	590
Oregon	48,158	53,243	55,470	6,335	6,235	6,130	*	209	215
California	129,480	139,735	144,900	6,270	6,102	5,960	1,016	1,123	1,150
PACIFIC	**230,939**	**252,355**	**262,210**	**21,036**	**20,651**	**20,280**	**1,486**	**1,890**	**1,955**
TOTAL	**4,622,705**	**4,519,699**	**4,450,000**	**654,667**	**644,262**	**635,000**	**346,964**	**369,115**	**375,000**

*Not reported separately.

Principal Machines on Farms – 1986

	PICK-UP BALERS			FIELD FORAGE HARVESTERS[1]			MOWER CONDITIONERS[2]		
STATE	1978 Census Number	1982 Census Number	Estimated July 1, 1986 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1986 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1986 Number
Maine	2,609	3,047	3,210	1,309	1,181	1,100	2,023	2,353	2,560
New Hampshire	1,254	1,259	1,240	545	544	530	889	960	1,015
Vermont	4,082	4,167	4,150	2,707	2,569	2,425	3,777	3,866	3,935
Massachusetts	1,732	1,704	1,560	1,092	1,083	1,060	1,472	1,533	1,580
Rhode Island	181	205	210	113	93	80	124	146	160
Connecticut	1,509	1,508	1,480	804	773	740	1,063	1,318	1,480
New York	28,853	28,078	27,250	20,298	19,040	18,075	25,390	25,603	25,840
New Jersey	2,194	2,260	2,270	1,093	1,165	1,175	2,275	2,386	2,460
Pennsylvania	37,288	37,257	36,600	18,891	18,078	17,190	29,419	29,456	29,650
Delaware	568	531	510	269	249	230	587	519	480
Maryland	5,581	5,719	5,700	2,852	2,670	2,550	4,653	5,136	5,400
NORTHEAST	**85,851**	**85,735**	**84,180**	**49,973**	**47,465**	**45,155**	**71,672**	**73,276**	**74,560**
Ohio	38,496	39,754	39,700	11,209	11,090	10,850	26,997	26,143	25,850
Indiana	23,838	23,947	23,700	6,912	6,917	6,795	15,733	15,583	15,540
Illinois	30,632	30,463	29,900	11,557	9,972	9,035	21,173	21,867	22,340
Iowa	47,389	47,776	47,500	19,393	17,638	16,500	26,375	28,401	29,700
Missouri	43,981	48,662	49,800	8,704	8,055	7,560	23,469	26,527	28,250
CORN BELT	**184,336**	**190,602**	**190,600**	**57,775**	**53,672**	**50,740**	**113,747**	**118,521**	**121,680**
Michigan	24,536	25,051	25,000	12,704	11,809	11,100	20,696	21,055	21,400
Wisconsin	58,443	58,042	57,200	43,154	43,880	43,555	51,830	51,630	51,700
Minnesota	50,165	51,038	50,800	23,341	23,803	23,600	31,714	32,050	32,400
LAKE STATES	**133,144**	**134,131**	**133,000**	**79,199**	**79,492**	**78,255**	**104,240**	**104,735**	**105,500**
North Dakota	15,180	16,628	17,100	5,538	4,839	4,520	6,315	6,181	6,120
South Dakota	14,174	17,966	19,600	11,280	10,568	10,020	5,673	6,958	7,180
Nebraska	16,968	18,906	19,800	13,870	12,538	11,690	14,740	15,497	16,060
Kansas	29,222	31,998	33,100	10,778	9,367	8,500	17,144	18,932	19,880
GREAT PLAINS	**75,544**	**85,498**	**89,600**	**41,466**	**37,312**	**34,730**	**43,872**	**47,568**	**49,240**
West Virginia	9,119	10,550	11,150	2,094	2,323	2,375	5,035	6,033	6,570
Kentucky	31,575	35,143	36,700	7,752	7,910	7,865	23,656	23,805	24,100
Tennessee	22,028	26,506	28,500	5,202	6,313	6,775	16,834	18,734	19,580
Virginia	17,932	21,805	23,100	6,075	6,209	6,160	12,404	14,659	16,060
North Carolina	12,461	12,752	12,550	4,204	3,502	3,040	10,577	10,888	11,040
APPALACHIAN	**93,115**	**106,756**	**112,000**	**25,327**	**26,257**	**26,215**	**68,506**	**74,119**	**77,350**
South Carolina	4,404	4,823	4,850	1,369	1,260	1,175	3,370	4,033	4,400
Georgia	8,671	10,407	11,100	2,652	2,717	2,700	9,176	9,465	9,630
Florida	2,787	3,754	4,180	903	861	830	6,406	7,591	8,330
Alabama	10,068	11,322	11,700	2,102	2,112	2,080	8,349	8,212	8,180
SOUTHEAST	**25,930**	**30,306**	**31,830**	**7,026**	**6,950**	**6,785**	**27,301**	**29,301**	**30,540**
Mississippi	8,286	10,509	11,450	2,003	1,927	1,860	7,294	7,949	8,340
Louisiana	5,666	6,425	6,720	1,299	1,327	1,310	6,587	6,698	6,800
Arkansas	10,783	13,994	15,500	1,882	1,634	1,470	8,366	10,035	11,000
DELTA STATES	**24,735**	**30,928**	**33,670**	**5,184**	**4,888**	**4,640**	**22,247**	**24,682**	**26,140**
Oklahoma	19,242	22,690	24,100	2,420	2,491	2,490	14,990	17,107	18,370
Texas	26,382	33,736	36,100	5,339	5,109	4,890	32,449	39,629	37,550
SOUTHERN PLAINS	**45,624**	**56,426**	**60,200**	**7,759**	**7,600**	**7,380**	**47,439**	**56,736**	**55,920**
Montana	11,692	12,468	12,730	2,086	2,429	2,550	7,304	8,102	8,530
Idaho	12,862	12,210	11,750	2,391	2,384	2,340	9,029	8,515	8,280
Wyoming	4,468	5,066	5,330	1,261	1,222	1,175	3,433	3,904	4,175
Colorado	10,374	10,365	10,200	4,355	3,503	3,050	7,259	7,040	6,980
New Mexico	3,252	3,403	3,450	774	802	805	2,317	2,395	2,460
Arizona	1,004	6,942	1,040	298	348	360	780	861	910
Utah	6,922	6,965	6,890	1,874	1,978	2,000	5,098	5,547	5,820
Nevada	1,470	1,598	1,630	353	437	470	1,245	1,314	1,365
MOUNTAIN STATES	**52,044**	**53,117**	**53,020**	**13,392**	**13,103**	**12,750**	**36,465**	**37,678**	**38,520**
Washington	8,717	9,518	9,780	2,890	3,060	3,095	8,107	9,838	10,840
Oregon	8,443	9,730	10,260	2,602	2,555	2,485	7,033	8,528	9,370
California	6,358	6,725	6,860	2,530	2,715	2,770	7,558	9,299	10,340
PACIFIC	**23,518**	**25,973**	**26,900**	**8,022**	**8,330**	**8,350**	**22,698**	**27,665**	**30,550**
TOTAL	**743,841**	**799,472**	**815,000**	**295,123**	**285,069**	**275,000**	**558,187**	**594,281**	**610,000**

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[1] Shear-bar type. [2] Does not include windrowers with conditioning rolls.

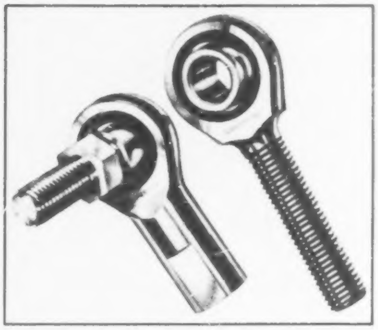
Principal Machines on Farms – 1986

STATE	POWER ELEVATORS Estimated July 1, 1986 Number	MANURE SPREADERS Estimated July 1, 1986 Number	CORN & COTTON PLANTERS Estimated July 1, 1986 Number	GRAIN DRILLS Estimated July 1, 1986 Number	MOLDBOARD PLOWS Estimated July 1, 1986 Number	SIDE DELIVERY RAKES Estimated July 1, 1986 Number	POWER TRACTOR MOWERS* Estimated July 1, 1986 Number
Maine	4,815	2,860	295	790	7,850	5,400	6,170
New Hampshire	2,275	1,830	265	60	2,680	2,290	2,820
Vermont	7,315	5,760	1,480	295	9,070	6,820	8,380
Massachusetts	3,280	2,080	810	110	5,430	3,250	3,700
Rhode Island	460	240	100	30	630	300	300
Connecticut	3,820	2,235	950	80	5,150	2,300	3,250
New York	63,730	36,800	18,150	24,800	71,800	44,200	51,600
New Jersey	5,600	2,200	2,220	2,270	14,960	3,700	4,260
Pennsylvania	67,840	38,100	31,250	37,200	91,200	45,600	57,200
Delaware	3,600	1,610	1,950	1,880	5,750	970	980
Maryland	14,955	7,685	7,980	8,200	25,800	8,300	10,600
NORTHEAST	**177,690**	**101,400**	**65,450**	**75,715**	**240,320**	**123,130**	**149,280**
Ohio	116,550	51,525	59,200	59,300	146,600	51.900	60,500
Indiana	115,640	45,560	60,700	48,300	125,200	38,300	47,300
Illinois	176,000	66,645	88,800	60,900	162,400	49,700	66,600
Iowa	185,865	90,950	98,700	56,500	193,500	84,000	100,500
Missouri	82,425	51,130	47,300	49,100	136,400	49,600	81,200
CORN BELT	**676,480**	**305,810**	**354,700**	**274,100**	**764,100**	**273,500**	**356,100**
Michigan	82,600	33,620	35,900	47,700	118,200	40,700	44,900
Wisconsin	130,275	77,190	63,300	60,800	151,400	85,100	97,100
Minnesota	145,930	69,830	76,200	70,500	163,300	82,300	90,500
LAKE STATES	**358,805**	**180,640**	**175,400**	**179,000**	**432,900**	**208,100**	**232,500**
North Dakota	70,760	19,000	14,250	55,800	59,900	21,460	38,200
South Dakota	62,830	26,550	28,700	31,600	60,100	21,850	44,600
Nebraska	97,355	40,680	42,900	40,500	85,300	33,200	51,600
Kansas	103,880	33,920	20,800	65,800	86,600	34,100	51,100
GREAT PLAINS	**334,825**	**120,150**	**106,650**	**193,700**	**291,900**	**110,610**	**185,500**
West Virginia	6,270	7,690	4,950	3,450	17,850	9,100	17,600
Kentucky	24,180	25,360	36,400	10,650	101,400	29,500	47,400
Tennessee	14,900	18,500	49,200	13,300	65,800	23,500	50,800
Virginia	18,420	19,790	24,500	16,050	61,100	22,400	31,000
North Carolina	20,170	19,390	69,100	21,500	58,700	15,300	31,500
APPALACHIAN	**83,940**	**90,730**	**184,150**	**64,950**	**304,850**	**99,800**	**178,300**
South Carolina	4,580	3,580	28,950	11,100	10,200	5,650	9,700
Georgia	13,690	6,060	36,800	9,570	29,000	10,180	16,150
Florida	3,630	1,090	5,650	1,660	18,800	1,850	3,680
Alabama	11,240	4,045	40,100	6,730	21,700	7,300	15,800
SOUTHEAST	**33,140**	**14,775**	**111,500**	**29,060**	**79,700**	**24,980**	**45,330**
Mississippi	7,685	4,625	49,800	7,920	27,400	9,370	20,900
Louisiana	2,510	2,665	16,800	7,080	20,500	6,050	10,550
Arkansas	9,380	6,495	20.700	12,650	45,300	10,100	20,200
DELTA STATES	**19,575**	**13,785**	**87,300**	**27,650**	**93,200**	**25,520**	**51,650**
Oklahoma	25,040	8,435	8,750	30,900	75,800	19,200	31,600
Texas	39,845	16,010	52,600	48,400	86,700	22,300	45,900
SOUTHERN PLAINS	**64,885**	**24,445**	**61,350**	**79,300**	**162,500**	**41,500**	**77,500**
Montana	27,850	9,945	1,040	20,900	26,930	13,500	20,900
Idaho	24,320	12,400	2,530	15,200	32,700	15,800	20,800
Wyoming	5,000	4,250	910	4,050	15,350	5,090	5,980
Colorado	25,060	12,660	5,920	15,100	25,700	13,900	15,340
New Mexico	2,560	2,060	3,010	1,910	8,600	4,100	4,590
Arizona	1,795	875	1,810	1,390	3,300	1,380	1,980
Utah	10,000	6,860	1,620	5,380	14,850	9,130	10,550
Nevada	935	1,010	60	315	2,500	1,460	1,520
MOUNTAIN STATES	**97,520**	**50,060**	**16,900**	**64,245**	**129,930**	**64,360**	**81,660**
Washington	21,630	13,080	1,750	16,900	36,300	13,300	20,200
Oregon	17,430	11,545	1,080	11,630	35,300	11,700	19,000
California	24,080	13,580	8,770	8,750	59,000	13,500	23,000
PACIFIC	**63,140**	**38,205**	**11,600**	**37,280**	**130,600**	**38,500**	**62,200**
TOTAL	**1,910,000**	**940,000**	**1,175,000**	**1,025,000**	**2,630,000**	**1,010,000**	**1,420,000**

*Cutter bar type only.

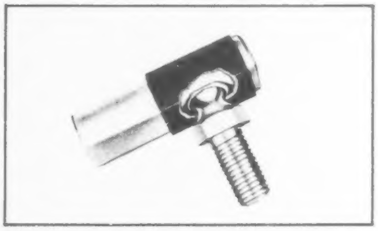
(advertisement)

CONCEPTS IN MOTION TRANSMISSION



High Wear-Resistance Rod Ends

Patented Superior process produces rod ends that provide high wear resistance in demanding applications . . . at a significant saving. Locks in lubricated raceways of fiberglass reinforced nylon, providing maximum contact with precision hardened steel balls, creating free movement with minimum play. Available in both male and female designs, left and right hand thread styles. Sizes from #10-32 through ¾-16, with and without mounting studs. All units plated and dichromate treated for exceptional corrosion resistance. **Tuthill Corporation, Superior Linkage Division, 2110 Summit Street, New Haven, Indiana 46774.**



Type SPG Ball Joints With Alignment Guide

Type SPG patented ball joint, designed for heavy duty service, has "flat top" alignment guide which makes it easy to align ball stud in vertical position to provide maximum movement in all directions, facilitates torquing of lock nuts. Ball joints swivel in 38° minimum cone. Thread sizes from #10-32 through ½-20. Includes Buna-N rubber dirt shield. Ball cavities packed with Lubriplate. Ball studs case hardened steel. Plated and dichromate treated for exceptional corrosion resistance. **Tuthill Corporation, Superior Linkage Division, 2110 Summit Street, New Haven, Indiana 46774.**

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Principal Machines on Farms — 1986

STATE	MOTOR TRUCKS			INTERNAL COMBUSTION ENGINES[1]	CHAIN SAWS
	1978 Census 1,000's	1982 Census 1,000's	Estimated July 1, 1986 1,000's	Estimated July 1, 1986 Number	Estimated July 1, 1986 Number
Maine	12.3	12.2	12.1	1,420	7,300
New Hampshire	3.8	4.1	4.3	1,330	2,410
Vermont	6.6	7.5	7.9	1,860	6,060
Massachusetts	9.0	9.4	9.5	1,920	4,420
Rhode Island	1.3	1.3	1.3	200	620
Connecticut	6.6	6.8	6.8	1,690	3,710
New York	57.6	60.5	61.7	22,100	48,750
New Jersey	14.4	15.2	15.6	2,470	5,830
Pennsylvania	63.8	66.1	66.8	21,700	42,700
Delaware	6.2	6.2	6.1	990	2,470
Maryland	22.8	25.9	27.4	4,820	11,950
NORTHEAST	**204.4**	**215.2**	**219.5**	**60,500**	**136,220**
Ohio	107.1	107.8	107.4	20,400	59,480
Indiana	114.4	112.2	111.4	21,100	63,750
Illinois	150.6	150.6	149.4	31,400	69,200
Iowa	144.0	147.7	148.4	33,400	55,000
Missouri	155.9	159.7	161.6	34,600	92,100
CORN BELT	**672.0**	**678.0**	**678.2**	**140,900**	**339,530**
Michigan	77.4	80.3	81.5	19,000	44,450
Wisconsin	98.0	99.5	99.4	36,400	90,250
Minnesota	144.1	143.8	142.4	49,400	64,550
LAKE STATES	**319.5**	**323.6**	**323.3**	**104,800**	**199,250**
North Dakota	107.7	101.1	96.4	37,200	4,170
South Dakota	66.0	68.0	68.5	24,800	3,220
Nebraska	118.6	118.9	118.2	33,800	13,730
Kansas	160.8	159.4	157.1	43,500	22,650
GREAT PLAINS	**453.1**	**447.4**	**440.2**	**139,300**	**43,770**
West Virginia	19.2	20.5	21.0	5,300	21,200
Kentucky	119.3	125.2	128.0	17,000	43,700
Tennessee	96.4	104.7	109.0	13,100	57,600
Virginia	62.6	68.0	70.2	12,700	47,400
North Carolina	106.2	103.3	100.5	16,500	85,000
APPALACHIAN	**403.7**	**421.7**	**428.7**	**64,600**	**254,900**
South Carolina	36.1	34.6	33.4	6,500	24,000
Georgia	74.3	72.6	71.1	13,400	33,100
Florida	49.4	51.2	51.8	12,800	7,590
Alabama	68.6	67.4	66.2	10,900	31,260
SOUTHEAST	**228.4**	**225.8**	**222.5**	**43,600**	**95,950**
Mississippi	58.0	59.0	59.1	10,500	36,900
Louisiana	44.9	44.3	43.8	12,500	20,250
Arkansas	80.7	79.3	77.8	14,200	31,100
DELTA STATES	**183.6**	**182.6**	**180.7**	**37,200**	**88,250**
Oklahoma	118.3	122.8	125.5	21,200	10,030
Texas	239.0	249.9	264.6	63,300	19,600
SOUTHERN PLAINS	**357.3**	**372.7**	**390.1**	**84,500**	**29,630**
Montana	67.2	68.2	68.3	19,300	11,940
Idaho	56.7	57.1	56.7	15,800	13,230
Wyoming	20.0	22.1	23.2	6,250	3,240
Colorado	63.4	63.0	62.3	20,300	6,120
New Mexico	23.9	24.6	24.9	7,600	3,040
Arizona	15.3	16.6	17.2	5,200	520
Utah	21.7	23.3	24.1	6,600	2,400
Nevada	6.0	6.5	6.7	1,550	610
MOUNTAIN STATES	**274.2**	**281.4**	**283.4**	**82,600**	**41,100**
Washington	64.7	69.2	70.6	16,500	23,000
Oregon	54.4	61.2	58.8	21,400	26,100
California	134.6	147.9	154.0	64,100	32,300
PACIFIC	**253.7**	**278.3**	**283.4**	**102,000**	**81,400**
TOTAL	**3,349.9**	**3,426.7**	**3,450.0**	**860,000**	**1,310,000**

[1] Includes engines used for stationary work such as irrigation, auxiliary engines on combines, balers, etc., and a small number of power units not elsewhere classified.

NEW AGRICULTURAL WHEEL TRACTOR IMPORTS JAN. 1981 – JUNE 1986

Nation of Origin	Under 40 HP*	40-79 HP*	80-99 HP*	100 HP and Over*	HP Not Specifically Provided*	Not Elsewhere Specified, Excl. Industrial, Incl. Garden Types**	TOTALS
Canada							
6 mos., 1986	74	35	22	257	19	336	743
year 1985	118	66	94	637	786	589	2,290
year 1984	56	74	145	899	1,539	985	3,698
year 1983	53	59	111	718	1,191	534	2,666
year 1982	32	63	84	347	1,383	233	2,142
year 1981	73	47	121	461	1,915	153	2,770
United Kingdom							
6 mos., 1986	3,323	9,583	731	18	93	154	13,902
year 1985	5,362	11,028	1,220	565	101	137	18,413
year 1984	4,955	16,166	2,304	1,498	72	330	25,325
year 1983	5,173	13,502	1,840	843	32	102	21,492
year 1982	546	3,195	754	156	74	284	5,009
year 1981	614	6,031	1,109	682	15	93	8,544
Japan							
6 mos., 1986	30,550	8,608	56	67	268	7,892	47,441
year 1985	58,807	13,306	75	76	233	16,331	88,828
year 1984	50,723	9,347	192	122	298	18,591	79,273
year 1983	41,265	4,490	69	136	350	9,809	56,119
year 1982	37,534	3,063	13	231	774	8,101	49,716
year 1981	40,978	2,821	3	85	714	5,469	49,530
West Germany							
6 mos., 1986	10	4,771	722	28	7	21	5,559
year 1985	999	6,639	1,513	473	119	140	9,883
year 1984	124	5,333	2,113	537	18	46	8,171
year 1983	97	10,570	2,747	363	6	33	13,816
year 1982	2	4,016	2,718	668	43	32	7,479
year 1981	2	6,653	2,421	750	7	8	9,841
Italy							
6 mos., 1986	38	520	38	.....	1	2,723	3,320
year 1985	267	1,501	143	205	20	1,105	3,241
year 1984	141	1,836	432	329	1	496	3,235
year 1983	152	1,598	357	236	2	2,803	5,148
year 1982	417	1,399	369	863	2	67	3,117
year 1981	767	1,839	430	341	57	116	3,559
Romania							
6 mos., 1986	21	221	.....	.....	.....	.....	242
year 1985	353	830	.....	.....	.....	3	1,186
year 1984	225	946	.....	....	.....	.....	1,171
year 1983	271	1,166	.....	.....	.....	17	1,454
year 1982	1,101	3,317	1	1	12	14	4,446
year 1981	558	3,050	.....	1	.....	2	3,611
France							
6 mos., 1986	14	80	43	98	2	7	244
year 1985	138	360	193	255	4	42	992
year 1984	2	213	223	755	5	74	1,272
year 1983	133	819	234	8	.....	3	1,197
year 1982	.....	19	245	11	34	.....	309
year 1981	1	48	.....	17	.....	2	68
TOTALS							
6 mos., 1986	34,555	24,350	1,678	824	604	11,192	73,203
year 1985	66,600	34,392	3,318	2,301	1,830	18,518	126,959
year 1984	56,782	35,428	5,626	4,195	2,207	20,642	124,880
year 1983	47,289	34,085	5,367	2,311	1,603	13,406	104,061
year 1982	39,764	15,858	4,190	2,378	2,366	8,739	73,295
year 1981	44,208	21,012	4,084	2,339	2,714	5,858	80,215

Others in 1985: Czechoslovakia – 591; U.S.S.R. – 406; Netherlands – 389; Belgium – 157.
Others in first half 1986: Czechoslovakia – 535; U.S.S.R. – 418; Belgium – 446.
Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.
*Excluding garden tractors. **Including garden tractors and rototillers.

IMPORTS OF FARM EQUIPMENT BY PRODUCT

	Jan.-Dec., 1984		Jan.-Dec., 1985		Jan.-June, 1986	
Product	Quantity	Value in Thousands of Dollars	Quantity	Value in Thousands of Dollars	Quantity	Value in Thousands of Dollars
Knives & Cutting Blades	10,337,480	$ 8,785	11,710,518	$ 10,240	5,142,368	$ 4,463
Plows & Listers	2,184	5,479	2,555	2,700	1,692	4,613
Cultivators & Weeders	16,517	17,711	19,075	14,198	20,308	12,304
Parts of Plows, Cultivators, Weeders & Listers	.....	30,732	.....	29,840	.....	13,589
Harrows, Rollers, Stalk Cutters, Soil Pulverizers	23,383	7,956	32,375	10,844	22,599	7,774
Parts of Harrows, Rollers, Stalk Cutters, etc.	.....	19,777	.....	13,531	.....	5,745
Planting, Seeding & Fertilizing Machinery	38,908	31,376	39,976	23,633	21,889	13,073
Parts of Planting, Seeding & Fertilizing Machinery	.....	10,716	.....	9,101	.....	4,818
Haying Machinery other than Mowers	6,614	11,411	7,661	10,426	4,260	8,392
Mowers except Lawn Mowers	14,711	31,079	17,140	29,906	13,411	21,681
Harvesting Machines, NES	10,520	82,393	10,312	75,217	4,560	18,433
Parts of Harvesting Machines	.....	57,903	.....	56,216	.....	28,326
Farm Wagons & Carts	3,041	4,148	4,571	4,368	2,338	2,085
Agricultural Machines & Implements, NES	.....	122,054	.....	131,945	.....	78,631
Parts of Agricultural Machines, NES	.....	81,670	.....	78,377	.....	46,522
Tractors, Agricultural, Wheel-Type, New, excluding Industrial*	124,880	819,028	126,959	718,163	73,203	435,772
Tractors, Agri., Used	5,457	40,525	6,605	41,883	2,293	15,382
Parts for Agri. Tractors	.....	323,003	.....	285,290	.....	146,996
Walk-Behind Rotary Tillers	NA	NA	3,889	1,765	10,645	1,187

Source: U.S. Dept. of Commerce, International Trade Administration, Office of Capital Goods and International Construction.
NES – Not elsewhere specified.
*Use of the term "Industrial" here is understood to refer to such machines as forklifts but not to industrial tractors as commonly defined in the farm and industrial equipment industry.

VASSAR "ROOTHAWG®" Root Grubber
Put those non-productive acres to use with the "ROOTHAWG".

ROOTHAWG does what your axe and grubbing hoe can't. Cuts to depths of 12" to 15" — Use on Cedar, Mesquite, Sumac and other types of brush.

ROOTHAWG helps to control growth of unwanted brush — Ridding your fields of moisture robbers — reestablishing grass in your brush area.

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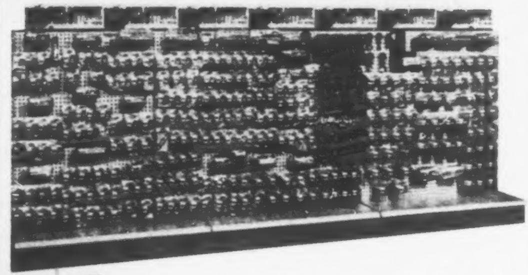

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DOLLAR VALUE OF FARM EQUIPMENT IMPORTS BY COUNTRY OF ORIGIN, Jan., 1981-June, 1986
(In thousands)

Country	Jan.-Dec. 1981	Jan.-Dec. 1982	Jan.-Dec. 1983	Jan.-Dec. 1984	Jan.-Dec. 1985	Jan.-June 1986
Canada	$706,276	$487,286	$453,551	$576,583	$415,527	$178,169
Mexico	9,699	11,349	18,563	10,099	8,159	2,535
Brazil	1,064	4,780	6,424	11,395	12,214	6,148
Sweden	2,784	3,023	2,873	4,002	3,464	2,497
Denmark	4,690	4,910	5,856	7,670	9,331	4,101
Netherlands	13,626	13,924	32,831	46,912	33,945	15,221
United Kingdom	153,589	93,806	163,678	217,201	207,020	128,910
Belgium	50,393	25,730	23,691	27,697	29,389	25,200
France	41,695	30,804	41,333	72,605	68,681	42,986
West Germany	197,110	169,087	248,015	223,651	222,756	137,242
Hungary	9,329	7,564	2,404	11,665	5,444	1,115
Czechoslovakia	NA	1,113	1,892	5,888	5,926	3,798
Romania	12,598	15,461	6,088	4,701	4,409	969
Italy	100,853	95,092	99,219	152,409	122,300	62,681
Spain	3,561	6,541	2,946	7,124	3,996	2,711
Israel	2,777	2,[illegible]7	2,988	4,183	7,619	4,158
New Zealand	8,630	9,7[illegible]	11,88[illegible]	11,220	10,725	4,289
Australia	7,306	4,662	3,209	4,568	5,421	3,810
Japan	202,000	181,056	204,818	309,757	355,577	232,920
China (Taiwan)	2,562	2,913	3,617	5,175	5,132	3,510
China (P.R.C.)	86	1,381	1,949	3,113	2,568	1,678
TOTAL	**$1,549,799**	**$1,179,734**	**$1,347,483**	**$1,729,402**	**$1,557,623**	**$876,790**

Source: U.S. Dept. of Commerce, International Trade Administration, Office of Capital Goods and International Construction.

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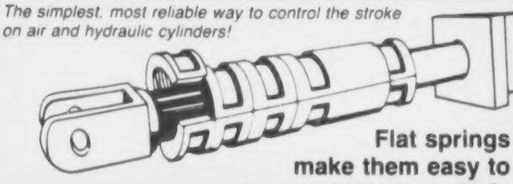
FARM EQUIPMENT EXPORTS BY TYPE OF PRODUCT

Product	Jan.-Dec., 1984 Quantity	Jan.-Dec., 1984 Dollar Value in Thousands	Jan.-Dec., 1985 Quantity	Jan.-Dec., 1985 Dollar Value in Thousands	Jan.-June, 1986 Quantity	Jan.-June, 1986 Dollar Value in Thousands
Combines, pull-type	1,073	$26,609	829	$13,423	993	$21,613
Combines, self-propelled	3,603	161,082	3,942	170,229	2,143	73,553
Cultivators, tractor-drawn or mounted	3,282	6,941	2,177	5,876	836	1,818
Cultivators, NEC, and Weeders	2,758	7,671	3,571	6,052	3,190	2,623
Farm Elevators and Blowers	1,304	4,340	1,766	5,770	600	1,724
Farm Wagons and Carts	1,590	2,750	833	2,021	385	770
Parts for Farm Wagons and Carts	.....	1,543	.....	897	.....	311
Fertilizing Machines	4,421	15,120	4,580	13,820	4,268	7,582
Forage Harvesters	1,841	23,772	1,655	19,861	769	14,195
Harrows, Disk	2,294	12,941	1,681	7,768	501	1,847
Harrows, NEC, & Soil Pulverizers	6,215	6,448	4,266	4,764	1,867	2,279
Parts for Harrows, Stalk Cutters & Soil Pulverizers	.....	5,547	.....	9,292	.....	1,907
Harvesting Machines, NEC	5,767	80,120	5,329	75,125	2,567	22,674
Harvesting Machine Parts	.....	140,082	.....	129,487	.....	63,943
Hay Balers	5,567	37,181	4,387	32,563	2,888	21,705
Haying Machines, NEC (incl. rakes & tedders)	3,620	20,398	2,722	17,083	1,407	8,335
Parts for Haying Machines	.....	24,011	.....	14,845	.....	7,966
Mowers, Cutterbar, tractor-drawn	1,317	4,015	1,400	2,895	893	1,867
Mowers, Rotary, tractor-drawn (excl. lawn mowers)	11,187	7,076	7,481	5,691	5,239	3,520
Mowers, NEC, tractor-drawn (excl. lawn mowers)	1,888	7,448	2,372	6,647	1,218	4,037
Planting Machines	6,766	10,085	3,340	7,816	1,113	4,657
Plows, Disk	1,173	2,724	853	2,357	315	614
Plows, Moldboard	2,372	7,246	1,654	5,351	387	1,373
Plows & Listers, NEC	3,813	10,285	3,272	9,055	1,345	4,147
Parts for Plows, Listers, Cultivators & Weeders	.....	19,746	.....	9,184	.....	5,525
Seeding Machines	14,202	26,692	8,599	18,709	5,522	11,274
Parts for Planting, Seeding & Fertilizing Machines	.....	22,186	.....	13,479	.....	7,478
Farm Tractors:						
Under 40 PTO HP	660	3,407	669	3,521	513	2,380
40-59 PTO HP	629	6,174	798	8,536	369	3,745
60-79 PTO HP	882	13,084	818	12,279	312	4,878
80-99 PTO HP	989	23,318	1,164	23,580	260	4,979
100-119 PTO HP	842	23,918	760	22,200	346	11,680
120-139 PTO HP	1,781	62,957	1,741	60,801	533	18,235
140-159 PTO HP	1,439	53,560	1,264	47,619	641	22,957
160-179 PTO HP	1,472	65,856	1,409	63,625	798	33,125
180 HP & Over	2,380	150,476	1,793	119,052	861	55,037
Other Farm Tractors	1,414	17,939	1,157	23,815	861	10,723
Parts for Farm Tractors	.....	672,613	.....	566,941	.....	243,484

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.
NEC – Not elsewhere counted or classified.

STROKE CONTROL SEGMENTS

The simplest, most reliable way to control the stroke on air and hydraulic cylinders!



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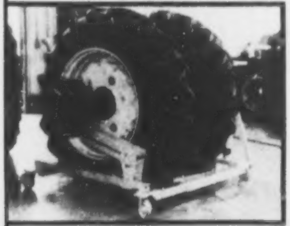

Three good reasons to have Cofer Tire Carts in your shop. . .

• Safety • Versatility • Time

Model DT 25–DT 27 • Dual or single tires • 6" casters • telescoping legs • adjustable tire support • 8,000 lb capacity

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Cofer Sales has the right heavy-duty tire cart for your shop. Three models are built to adapt to any size tire. And all three can be hooked up in minutes ... by one man. That saves time ... and money. Cofer Tire Carts are the safest way to handle tractor tires. For complete information on these and our complete line of shop equipment call or write.

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VALUE OF U.S. FARM EQUIPMENT EXPORTS BY COUNTRIES OF DESTINATION

(Value in thousands of dollars)

Country	1983	1984	1985	Jan.-June 1986
Western Hemisphere				
Canada	$852,317	$891,074	$791,762	$396,120
Mexico	45,610	113,912	214,838	46,607
Guatemala	2,719	3,610	3,719	1,995
Honduras	3,200	5,890	3,884	1,367
Nicaragua	5,446	7,296	5,103	.....
El Salvador	2,372	3,661	2,397	1,458
Costa Rica	3,083	6,306	5,073	2,223
Panama	3,797	2,704	3,396	1,324
Trinidad	4,064	2,544	2,410	1,090
Dominican Republic	6,142	5,545	4,934	6,353
Colombia	16,778	16,191	11,989	7,026
Jamaica	3,511	4,398	3,210	1,336
Venezuela	19,045	23,904	43,193	29,488
Brazil	9,048	16,423	17,707	7,992
Argentina	9,792	10,136	5,283	2,437
Bolivia	790	3,636	3,382	1,638
Chile	3,517	5,581	7,385	2,248
Ecuador	5,886	6,858	11,056	5,707
Peru	7,100	7,052	4,079	1,978
Europe				
Denmark	1,969	2,467	1,983	2,239
Sweden	8,760	9,066	3,445	2,602
United Kingdom	65,761	68,267	53,285	33,882
Netherlands	10,143	7,586	6,850	7,092
Belgium	55,046	53,832	23,595	22,376
France	97,761	89,374	60,232	43,800
West Germany	76,414	67,436	56,817	37,941
Hungary	13,203	10,955	12,741	9,887
Switzerland	2,844	3,204	2,441	1,899
Spain	7,871	10,986	9,760	7,716
Italy	6,660	8,610	7,572	7,988
Yugoslavia	1,789	1,532	2,893	1,753
Greece	7,416	22,295	18,094	1,005
U.S.S.R.	16,075	12,546	15,622	2,790
Middle East				
Israel	15,181	16,958	13,844	3,176
Kuwait	1,446	1,691	3,099	1,423
Saudi Arabia	307,795	257,307	96,269	23,699
Jordan	1,641	3,664	2,524	322
Iraq	1,380	2,136	5,321	1,698
Asia and Pacific				
India	4,037	2,959	801	674
Thailand	3,247	2,650	1,956	621
Singapore	12,731	13,100	4,315	2,680
Indonesia	5,440	3,795	936	1,020
Sri Lanka	5,397	7,674	3,028	176
China (Taiwan)	1,399	2,296	2,635	1,406
China (P.R.C.)	1,791	16,894	6,545	7,402
Philippines	3,432	4,045	1,967	1,031
Korea	5,098	5,236	3,294	1,346
Japan	20,001	20,196	17,458	10,984
Australia	97,970	214,075	141,506	26,778
New Zealand	5,489	5,293	3,723	1,134
Africa				
Algeria	6,917	5,133	4,418	4,289
Libya	3,276	19,687	14,819	1,196
Sudan	10,081	4,498	2,163	2,268
Nigeria	1,668	2,538	5,856	2,741
Egypt	13,092	11,436	22,510	5,755
Rep. South Africa	57,023	59,537	29,370	14,603
Morocco	1,936	256	4,148	397
Rhodesia	5,354	1,643	2,904	1,094
Total U.S. Exports, Farm & Industrial Equipment	**$2,014,069**	**$2,235,014**	**$1,854,772**	**$835,584**

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.

Self-Competing Dealer

(Continued from page 9)

Naturally, they were concerned. Lawson was asked to come into the Kansas City office and explain what he was doing.

"We talked over various phases of the project, and I assured them that Lawson Truck & Tractor would continue to represent them as it had in the past. We debated how ownership of two competing-line dealerships was not all that unique to the industry in 1986. I also reminded them how many dealerships were dualing with more than one line being offered under one roof."

Lawson made the point that the two dealerships would be separate entities, each with a different manager. There would be two sets of internal controls, and two separate banks would be used. There would be no merging of the two dealerships' assets.

"I don't think that under these circumstances, Case-IH interests would be affected," Lawson says. "Had I tried to merge another tractor line right into the home operation at Stanberry, that could have been another matter."

What's the volume objective? Stanberry will produce about $3 million in a good year. "And we're shooting for $1 million in the Albany store's first year under new ownership," says Lawson. "With proper management, we expect that it can be a $2 million-plus dealership."

What would Lawson advise other dealers who might face a decision similar to the one he dealt with?

"Mine was a unique opportunity. I'd advise anyone to take the precautions I did. Make certain there is financial backing in the community the dealership proposes to serve. Be sure the purchased business forces no financial strain on your existing dealership. And be completely dedicated to the success of the business."

Some dealers are seeking diversification from the farm equipment business. But Charles Lawson sees it this way:

"I feel that buying another farm equipment dealership is far better than trying to diversify—for instance, by installing a computer store in a shopping mall.

"If you know you are good at selling farm equipment, then stick to it!" □

FARM WHEEL TRACTOR
RETAIL SALES BY STATE, 1982-1985

	1982			1983			1984			1985		
State	2-wheel Drive 40 PTO HP & over	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors
Alabama	1,108	14	1,122	2,325	3	2,328	2,653	10	2,663	2,872	2	2,874
Alaska	10	.....	10	78	.....	78	71	.....	71	39	.....	39
Arizona	425	73	498	619	27	646	782	30	812	1,240	29	1,269
Arkansas	1,772	125	1,897	3,582	139	3,721	3,714	91	3,805	3,683	70	3,753
California	2,976	251	3,227	5,040	214	5,254	5,946	186	6,132	4,931	74	5,005
Colorado	634	121	755	1,188	126	1,314	1,234	106	1,340	983	89	1,072
Connecticut	145	2	147	491	−2	489	618	3	621	715	1	716
Delaware	79	5	84	258	4	262	248	7	255	286	7	293
Florida	1,636	55	1,691	3,622	68	3,690	4,614	19	4,633	4,543	30	4,573
Georgia	1,821	27	1,848	3,660	6	3,666	4,655	10	4,665	5,242	5	5,247
Hawaii	37	2	39	141	.....	141	116	5	121	126	9	135
Idaho	812	197	1,009	1,013	131	1,144	1,062	117	1,179	786	83	869
Illinois	3,580	600	4,180	4,658	433	5,091	3,958	312	4,270	3,327	252	3,579
Indiana	1,807	289	2,096	2,837	197	3,034	2,801	135	2,936	2,789	113	2,902
Iowa	4,319	475	4,794	4,149	284	4,433	2,964	129	3,093	1,894	68	1,962
Kansas	2,353	515	2,868	2,575	403	2,978	2,199	342	2,541	1,739	248	1,987
Kentucky	2,609	23	2,632	3,244	21	3,265	2,945	15	2,960	3,044	23	3,067
Louisiana	1,607	66	1,673	4,143	64	4,207	3,894	48	3,942	3,419	66	3,485
Maine	242	3	245	549	1	550	615	.....	615	625	.....	625
Maryland	492	14	506	1.440	17	1,457	1,683	7	1,690	2,139	3	2,142
Massachusetts	144	1	145	517	.....	517	621	.....	621	783	.....	783
Michigan	1,613	197	1,810	2,569	143	2,712	2,751	132	2,883	2,975	74	3,049
Minnesota	2,793	479	3,272	3,029	386	3,415	2,441	295	2,736	1,714	202	1,916
Mississippi	1,563	71	1,634	2,571	31	2,602	3,030	25	3,055	3,172	20	3,192
Missouri	2,531	209	2,740	3,086	118	3,204	3,036	75	3,111	3,159	35	3,194
Montana	754	324	1,078	861	260	1,121	677	195	872	602	122	724
Nebraska	2,337	226	2,563	2,121	168	2,289	1,598	99	1,697	963	63	1,026
Nevada	66	5	71	79	4	83	82	6	88	113	4	117
New Hampshire	158	.....	158	505	.....	505	712	1	713	946	.....	946
New Jersey	249	1	250	781	1	782	1,039	1	1,040	1,062	1	1,063
New Mexico	286	14	300	421	12	433	371	19	390	529	18	547
New York	1,741	77	1,818	2,825	54	2,879	3,296	45	3,341	3,717	21	3,738
North Carolina	2,022	34	2,056	4,072	12	4,084	4,571	12	4,583	4,478	9	4,487
North Dakota	1,322	740	2,062	1,354	491	1,845	1,112	457	1,569	917	351	1,268
Ohio	1,975	164	2,137	3,475	128	3,603	3,887	108	3,995	4,537	56	4,593
Oklahoma	1,891	279	2,170	2,557	218	2,775	2,364	213	2,577	2,203	167	2,370
Oregon	868	84	952	1,601	56	1,657	1,705	41	1,746	1,606	36	1,642
Pennsylvania	1,575	26	1,601	3,425	24	3,449	3,717	21	3,738	4,095	16	4,111
Rhode Island	12	.....	12	64	.....	64	85	.....	85	97	.....	97
South Carolina	779	17	796	1,524	10	1,534	1,904	2	1,906	2,171	5	2,176
South Dakota	1,355	238	1,593	1,230	221	1,451	1,060	169	1,229	809	158	967
Tennessee	1,923	29	1,952	3,803	20	3,823	3,936	15	3,951	4,522	16	4,538
Texas	6,886	299	7,185	13,786	308	14,094	12,338	226	12,564	13,252	192	13,444
Utah	466	23	489	655	21	676	688	15	703	625	6	631
Vermont	245	8	253	414	1	415	509	5	514	600	2	602
Virginia	1,455	15	1,470	2,677	6	2,683	2,736	5	2,741	3,253	5	3,258
Washington	1,168	134	1,302	1,951	125	2,076	1,956	105	2,061	1,652	83	1,735
West Virginia	325	1	326	480	1	481	525	1	526	685	.....	685
Wisconsin	2,860	167	3,027	2,907	115	3,022	2,821	82	2,903	2,615	60	2,675
Wyoming	224	44	268	277	25	302	302	26	328	168	18	186
U.S. Government	98	.....	98	4	1	5	530	.....	530	13	.....	13
Miscellaneous	234	.....	234	605	3	608	590	3	593	306	.....	306
TOTAL	**70,381**	**6,763**	**77,144**	**111,838**	**5,099**	**116,937**	**113,759**	**3,975**	**117,734**	**112,761**	**2,912**	**115,673**

Source: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers or contractor's off-highway types. Tractors under 40 pto horsepower were not reported publicly by the FIEI prior to 1983. I&T estimates retail sales of such units were 42,000 in 1982.

RETAIL SALES OF SELECTED FARM EQUIPMENT – Jan.-Dec., 1984 and 1985(1)
(In Units)

State	Combines Self-Propelled		Corn Heads		Hay Balers(2)		Windrowers Self-Propelled				Grinder-Mixers		Shear-Bar Forage Harvesters(3)		Mower Conditioners All Types	
							Power Units		Total Heads							
	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985	1984	1985
Alabama	89	59	23	24	101	86	.....	.....	.....	.....	41	41	12	11	91	88
Alaska	.....	.....	.....	.....	3	7	.....	.....	.....	.....	.....	.....	1	.....	3	5
Arizona	45	26	1	1	33	27	46	50	56	55	1	1	9	4	4	5
Arkansas	424	181	8	5	165	168	.....	.....	.....	.....	31	28	11	2	250	216
California	78	62	38	22	131	99	159	178	180	204	1	1	37	45	22	30
Colorado	121	109	47	34	258	229	112	103	123	120	12	12	23	21	85	110
Connecticut	.....	.....	.....	.....	37	26	.....	.....	.....	.....	1	1	31	19	60	48
Delaware	33	28	22	22	13	12	.....	1	.....	1	3	8	7	1	11	12
Florida	20	16	5	5	72	78	.....	1	– 2	2	3	5	16	17	38	54
Georgia	238	149	111	78	133	136	1	.....	1	.....	44	39	31	27	150	125
Hawaii	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	183	112	3	3	220	200	136	108	148	139	13	3	27	14	55	60
Illinois	1,424	1,086	1,297	1,062	236	143	4	3	6	3	140	129	103	49	417	325
Indiana	763	613	695	650	192	166	4	2	4	2	119	113	86	45	403	350
Iowa	982	635	1,115	640	171	80	22	15	23	16	288	180	105	46	517	252
Kansas	697	595	88	84	171	124	115	124	123	140	49	34	43	36	323	263
Kentucky	171	109	95	89	205	201	2	.....	2	.....	80	78	77	47	593	616
Louisiana	156	71	4	12	76	90	.....	.....	.....	.....	6	7	2	6	28	38
Maine	1	.....	.....	.....	53	53	2	2	2	2	.....	.....	20	28	86	71
Maryland	96	90	82	82	75	83	5	6	6	6	19	22	36	34	104	129
Massachusetts	.....	.....	.....	.....	37	27	.....	.....	.....	.....	.....	.....	24	28	58	68
Michigan	212	127	213	133	248	187	25	24	28	22	110	87	198	132	465	329
Minnesota	755	417	489	268	413	214	162	95	178	101	155	97	300	159	653	387
Mississippi	206	93	5	1	66	47	1	.....	1	.....	18	19	24	16	50	35
Missouri	444	397	141	157	298	255	22	11	16	12	118	71	44	29	879	628
Montana	191	120	.....	1	105	88	105	88	121	115	32	17	30	24	102	63
Nebraska	531	489	405	372	71	42	109	45	130	61	84	59	84	37	235	131
Nevada	1	1	.....	.....	28	26	26	31	30	37	2	2	2	10	8	14
New Hampshire	.....	.....	.....	.....	42	40	.....	.....	.....	.....	.....	1	20	15	57	57
New Jersey	11	6	4	8	29	32	1	.....	1	.....	9	3	6	4	50	43
New Mexico	11	23	1	2	151	124	38	50	40	52	2	2	3	6	24	35
New York	49	35	55	51	432	391	25	24	25	25	31	35	390	291	741	659
North Carolina	247	127	218	117	221	155	1	.....	1	.....	43	26	50	56	351	264
North Dakota	652	459	44	31	18	9	252	182	283	198	59	51	49	36	112	79
Ohio	466	438	391	369	340	307	11	11	11	11	145	118	131	100	613	646
Oklahoma	269	235	2	21	275	330	53	69	56	82	29	31	9	10	350	450
Oregon	77	85	8	8	167	159	65	94	74	115	2	6	28	21	78	95
Pennsylvania	112	95	107	101	539	468	31	26	31	26	132	147	266	206	842	717
Rhode Island	.....	.....	.....	.....	2	4	.....	.....	.....	.....	.....	.....	.....	.....	3	2
South Carolina	98	48	42	53	64	45	.....	1	.....	1	17	15	17	12	102	78
South Dakota	294	283	117	106	56	24	201	98	225	118	92	72	123	59	113	44
Tennessee	219	114	38	28	237	198	2	.....	2	.....	88	93	48	41	558	482
Texas	497	466	123	112	519	756	45	55	46	63	105	81	24	30	844	1,142
Utah	24	18	2	3	206	137	57	47	63	52	7	4	38	26	154	95
Vermont	.....	.....	2	....	55	58	4	6	4	7	1	.....	61	53	165	137
Virginia	92	72	68	51	167	141	2	1	2	1	47	39	105	69	545	485
Washington	157	141	16	12	210	167	53	61	64	57	1	– 1	28	40	110	95
West Virginia	2	.....	3	.....	84	68	.....	.....	.....	.....	15	10	12	17	121	114
Wisconsin	259	161	283	198	787	461	133	66	132	71	150	117	737	474	1,400	1,018
Wyoming	25	20	8	.....	102	65	59	35	71	43	4	10	10	5	34	30
U.S. Government	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Miscellaneous(4)	.....	.....	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	2	.....	24
TOTAL	**11,422**	**8,411**	**6,419**	**5,016**	**8,314**	**7,038**	**2,091**	**1,713**	**2,307**	**1,961**	**2,349**	**1,914**	**3,538**	**2,460**	**13,057**	**11,243**

Data released Feb. 4, 1986, Farm & Industrial Equipment Institute.

(1) Includes revisions for prior months.
(2) For making bales of under 200 lbs.
(3) Pull-type, mounted, self-propelled.
(4) Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

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12/30/86

I&T
100
YEARS OF
LEADERSHIP
1886-1986

Implement &Tractor

The business magazine of the farm and industrial equipment industry

DECEMBER 1986

How much does the boss make? page 10

Is this
we're
g?
page 16

The rollback's here to stay
page 12

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YEARS OF
LEADERSHIP
1886-1986

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

December 1986 • Vol. 101 • No. 14

Our cover story

Will dealers be selling parts for all makes? That's what's happening at the Dittamore dealership. While it took many hours of cross-referencing, the payoff has arrived, and the parts business is growing solidly. (Pictured, partsman Chris Nosdisch.)

16

Features

8: FIEI ponders restructuring, globalization, technology. How can manufacturers cope with re-sizing to a changed market, a world market, and a high tech world? FIEI's convention looked at the issues from a new perspective.

10: For dealers only: How the boss is paid. An I&T survey shows that despite substantial declines in volume, manager salaries have held up fairly well.

14: Competing with the majors: A changing competitive climate is forcing shortline manufacturers/wholesalers to look for "niche" products to help them stay profitable.

24: So why was everyone smiling? Part of the reason, for those at the FEMA convention, was that diversification means many shortliners are no longer dependent on agriculture.

26: Systematic diagnosis. The idea is to take a logical approach to finding out what's wrong with the machine, rather than going for the repair of symptoms.

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Farm Press Publications, Inc.

October sales: Plusses and minuses

The October flash report of the Farm & Industrial Equipment Institute showed a surge in U.S. retail sales of tractors over 100 horsepower, reversing to an extent the sharp decline reported for September.

	Unit Retail Sales					
	October			January-October		
	1986	1985	%	1986	1985	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	5,299	4,552	+16.4	54,648	50,703	+7.8
40 & Under 100 HP	3,170	3,547	-10.6	26,484	32,985	-19.8
100 & Under 140 HP	564	479	+17.7	4,439	6,437	-31.0
140 HP & Over	1,088	777	+40.0	8,125	8.766	-7.3
Total 2-Wheel Drive	**10,121**	**9,355**	**+8.2**	**93,696**	**98,891**	**-5.3**
4-Wheel Drive						
Under 200 HP	70	102	-31.4	457	738	-38.1
200 HP & Over	184	140	+31.4	1,127	1,410	-20.1
Total 4-Wheel Drive	**254**	**242**	**+5.0**	**1,584**	**2,148**	**-26.3**
Total Farm Wheel Tractors	**10,375**	**9,597**	**+8.1**	**95,280**	**101,039**	**-5.7**
Combines (Self-Propelled)	1,422	1,444	-1.5	6,568	6,352	+3.4
Balers (Bales under 200 lbs)	312	277	+12.6	5,345	6,556	-18.5
Forage Harvesters (Shear Bar Type)	386	398	-3.0	1,891	2,154	-12.2
Mower Conditioners	671	547	+22.7	10,038	10,358	-3.1

Hadskey named AIMRA president

Glynn Hadskey is the new president of the Agricultural & Industrial Manufacturers Representatives Association, succeeding Ted Stansbury. He took office at the group's October 22-24 convention at Las Vegas, Nev. Hadskey operates Short Line Sales, Baton Rouge, La.

Other new officers: Art Melcher, Melcher Equipment, Watertown, Wis., first vice-president; Bill Stephenson, Stephenson Agri-Sales, Poultney, Vt., second vice-president; Larry Dismore, Dismore & Associates, Scottsburg, Ind., secretary; and John Atkinson, Atkinson & Associates, Amherst, N.S., treasurer. Ted Stansbury, AG Marketing, Columbus, Ind., as past president, becomes board chairman.

Board members include Henry Chapman, Agri-Master, Milledgeville, Ga.; Bud Fuller, NW Ag & Industrial Agents, Gresham, Ore.; Bill Johnston, Johnston Sales Co., Mt. Vernon, Ill.; and Bob Gutzman, Gutzman Marketing, Wichita, Kan.

The group conferred its Manufacturer of the Year award on Great Plains Mfg., Inc., Assaria, Kan., in recognition of the company's marketing program, according to Frank Bistrom, AIMRA executive director.

Bistrom said the organization hosted 85 supplier companies at its semi-annual appointment session, which followed the convention of the Farm Equipment Manufacturers Association, also held at Bally's Grand Hotel in Las Vegas (see related story in this issue).

Bistrom told I&T the group plans another appointment session in advance of the International Lawn and Garden Power Equipment Exposition July 27-29, 1987, at Louisville, Ky.

AIMRA currently has 117 rep firms as regular members and 36 associate members.

Tenneco proceeds on Steiger buyout

Tenneco began its acquisition of Steiger Tractor, Inc., after receiving Justice Department notification November 7 that it would not seek to block Tenneco's tender offer.

Tenneco had previously announced it plans to consolidate Steiger operations with its Case IH subsidiary. Production and engineering of Steiger's four-wheel-drive tractors will continue at Fargo, N.D., while some administrative functions will be eliminated or transferred.

Steiger employs about 370 persons in North America. Case IH employs about 15,000 in North America and 28,500 worldwide.

Last of Ford's tractor production headed for Europe

Ford Tractor Operations has announced that its tractor plant at Romeo, Mich., will be phased out and all production moved to Europe by late 1988.

Production of three-cylinder agricultural tractors will be moved to Basildon, U.K., in 1987. Industrial tractor production will move to an as yet unspecified location in Europe by the end of 1988.

A Ford spokesman said Ford Tractor Operations had been developing an industrial plan that would involve product improvements and more efficient production, and that the decision to move production from Romeo to Europe resulted from this.

In October, the company announced the layoff of 114 workers at Romeo.

New venture: Imported used Kubota tractors

McConnell Manufacturing Company, Prattsburg, N.Y., has launched a program of marketing reconditioned Kubota tractors, originally sold on the Japanese market, through dealers in New York and Pennsylvania.

According to Ward McConnell, president, the company is committed to buying 50 tractors monthly from a Japanese trading firm that acquires the rebuilt units from a Japanese reconditioner. McConnell told I&T his firm has marketing rights east of the Rockies in the U.S. and in eastern Canada, as well as in the United Kingdom.

The imported units range in size from 15 to 35 horsepower. McConnell reported that the first week of meetings had produced 27 tractor orders by 11 Pennsylvania dealers. He estimated that volume could reach 2,000 units in a few years.

Briefly...

The downturn in farm debt that started in 1983 continued in 1985 and the first half of 1986, according to the Chicago Federal Reserve Bank. USDA estimates are that outstanding farm debt was $205 billion at the end of 1985, down 3.4 percent from a year earlier and 5.6 percent from the peak hit December 31, 1982. Excluding farm debt owed to the Commodity Credit Corporation, last year's decline was 7.7 percent.

(See Update, pg. 30)

FDO SURVEY REPORT

Good times or bad: Boss must be paid

By Scott Nesbitt

SOMEWHERE OUT THERE in dealer-land is a guy making $190,000 annually as a 20 percent owner of a dealership that sells $10.4 million a year. Nice going!

Elsewhere is a guy who drew $5,000 last year on sales of $50,000. But that's not bad. Back in 1980, he did $500,000 in sales, ended with a loss of $8,000 and took no salary from the business at all.

The I&T survey asking, "How Much Does The Boss Make?" pulled in a whole range of dealers, 37 who filled in all the blanks, and a number who started filling it out, stopped part way, but sent in the card anyway.

The responses split neatly into two piles: 20 whose sales volume went down from 1980 to 1985 (we call them Shrinkers) and 17 Growers who saw their volume increase over those years. They gave us some interesting numbers that might help others see how they stack up when the wife asks for money to pay the bills at home.

The overview is that there's still a decent buck to be made in the business, and with all the turmoil and craziness of the last few years, there are just about as many winners as losers — at least among dealerships that have stayed in business through the first half of the decade.

Growers keep growing

The 17 who gained in sales did a fine job. Starting with average sales of about $1.8 million in 1980, they'd increased 68 percent to break just over $3 million in 1985.

The bottom line went from an average net of $67,000 in 1980 to $107,000 in 1985, a growth of 59 percent — just about keeping pace with the increase in sales.

But these bosses didn't get greedy, on average. Their average take-home, including salary, bonuses, etc., went from $37,789 in 1980 to $44,872 in 1985, an 18 percent increase that didn't bleed the business.

Some of these Growers did right well for themselves. A manager-partner with a 30 percent stake in one operation reported 1980 sales of $1 million, with a loss that year of $75,000, with growth by 1985 to $5.2 million in sales, and $150,000 in net profit. His reward was a boost from $19,000 in salary in 1980 to a $42,600 salary and $25,000 bonus in 1985, for a total take-home of $70,600. Who says the business is all bad?

For those who like to ogle "Lifestyles of the Rich and Famous" and do a little dreaming, consider the 58 percent partner in a dealership that went from $2.8 million in 1980 to $5 million in 1985.

The business went from a net profit of $29,000 to $259,792 (some guys like to get exact when they're bragging), and the old pay envelope swelled from $66,420.51 in 1980 to $95,125.55 last year. Congratulations!

And that big guy we mentioned at the outset of this report did well, too. His operation went from $6.2 million in 1980 to $10.4 million, but the net profit slipped from $650,000 to $590,000. And his salary plus bonus went from $170,000 in 1980 to $190,000 today. There's that conservative tendency among the Growers.

Maybe there's a management tip in what he noted on the survey: "Five active partners own and manage the sales, service, parts, financing and accounting departments of our business," which has been around 51 years, and which purchased a second store between 1980 and 1985. Perhaps they should join the popular craze in management books, and call it "Profit for Capitalists through Socialism." Way to go!

Shrinkers in a slide

An unusual observation popped up when we split the survey respondents into Growers and Shrinkers, and it may say something important to those who are wondering about the future.

Not one of the Growers was a dealer-principal. Each was some sort of partnership or family corporation, except for two that were managers for absentee owners.

Ten of the 20 Shrinkers were dealer principals. Nine of the others were manager-partners, and one was a manager and corporate vice-president.

The survey is a small one and shouldn't be considered "scientific" by any means — but that grouping along the lines of management structure raises a question about whether it's better to run a one-man show or to share the responsibilities.

The Shrinkers as a group seem to have lost the ground the Growers gained. Their average sales dropped

(See Survey, pg. 20)

	Growers (17 dealers) 1980	1985	Change (%)
Average Sales	$1,794,647	$3,017,529	+ 68%
Net Profit	67,337	107,399	+ 59%
Boss's Total Compensation	37,789	44,872	+ 18%
	Shrinkers (20 dealers)		
Average Sales	$3,129,552	$1,981,318	—37%
Net Profit	107,286	15,290	—86%
Boss's Total Compensation	40,635	36,636	—10%

LETTERS

The Egg Test: Crawlers Overcame Compaction

To the editor:

I read in the October, 1986 issue of I&T, Frank Buckingham's article, "Where is Tillage Equipment Going?" with a lot of interest.

Deep tillage and multiple operation take a lot of power. Powerful wheel tractors are heavy, and the combination of weight and turning power and traction on the soil creates compaction. I notice you had a heading and considerable discussion on soil compaction.

The answer to soil compaction is a track-type tractor. We used to demonstrate by laying an egg in the loose soil and driving the Cletrac over it to show low compaction. I spent 14 years with the Cleveland Tractor Co., and then went with Ford-Ferguson, where we automatically transferred the weight and suction of the plow on the rear of the tractor to maintain traction as needed.

David A. Milligan
1565 Douglas Ave.
Racine, Ill. 53404

Survey (from page 10)

37 percent from just over $3.1 million in 1980 to $1.9 million in 1985. Net profit went down from $107,286 in 1980 to $15,290 in 1985, a plummet of 86 percent.

The boss's paycheck, on average, slipped 9.8 percent from $40,635 in 1980 to $36,636 in 1985.

Are there no bright spots left for these Shrinkers? Are they trapped in a downhill slide to extinction? Probably not.

Consider the corporate vice-president who said sales dropped from $1.9 million to $1.4 million, but the net profit line rose from $69,000 in 1980 to $97,000 in 1985. His personal fortunes slipped a bit, with the take-home going from $37,000 in 1980 to $34,000 in 1985.

That individual was the exception among the Shrinkers. The others shrunk in net profit, and seven of the 20 had taken a loss in 1985, compared to showing a profit in 1980. The biggest loss was a dealer who went from $1.9 million sales in 1980 to $1.4 million in 1985, and went from $18,300 profit to a loss of $108.200 in 1985. He noted that $55,000 of that loss was from bad debts. Oof!

But the main question here was the boss's salary, and the Shrinkers had some highs and lows.

Nine of the 20 had the same pay or took a cut between 1980 and 1985. The biggest pay cut was a dealer principal who took home $170,000 back then, and $44,000 last year, in keeping with the dealership's drop from $2.5 million to $1.7 million in sales. But he did hold up the bottom line, showing a 1985 net profit of $53,000, compared with $121,000 in 1980.

For 11 of the 20, there was a slightly larger paycheck despite the lower sales, with most increases being a few hundred up to about $10,000. One individual went from $57,000 in 1980 to $155,000 in 1985, after bonus money was figured in. Though the dealership had shrunk from $5 million to $3.8 million in sales, the net profit was $53,000 in 1985, against $135,000 in 1980.

Hanging up numbers like that, even in a slump, probably merits the big bucks. ☐

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Electrical service skills growing in demand

WHAT'S THE HOTTEST topic in the training of agricultural mechanics? It's the demand for an understanding of electricity/electronics, according to Duane Schindler, professor in agricultural industries and services at the University of Minnesota Technical College, Waseca, Minn.

One of Schindler's teaching responsibilities is a course titled "DC Electrical." Earlier, this electrical coursework was taught along with AC electrical in a course, "Agricultural Electrical Equipment."

The DC course gets into such systems in greater depth, says Schindler. This is necessary because of the sharp increase in electrical monitoring and controlling circuits on modern tractors, combines, and other equipment in the past decade. Examples of equipment that increase the demand for electrical skills are forage harvesters, planter monitoring systems, combine and tractor monitoring and solenoid valving.

Schindler says there is concern by many dealers that their technicians lack the necessary skills to service these new electrical components efficiently. In training programs, he adds, it is often the most difficult subject. With the addition of new electrical/electronic components in ag machinery, the basic charging components have become larger, he says. The entire electrical system has to be maintained at a higher level than in the past.

The class Schindler teaches covers four major areas — charging systems, starting systems, ignitions and auxiliary.

INVENTORY WATCH

What's happening to stockpiles in relation to sales.

Equipment	Inventory Levels Aug. 31, 1985	Mar. 31, 1986	April 30, 1986	May 31, 1986	June 30, 1986	July 31, 1986	Aug. 31, 1986	12-Month Sales, Sept. 1, 1985 Aug. 31, 1985
Tractors								
Under 40 hp	39,808	58,306	59,947	54,041	52,089	50,905	52,872	60,222
40-99 hp	27,724	27,136	27,457	27,319	25,751	26,055	25,417	31,659
100 hp and over	24,123	20,509	19,510	18,400	16,247	16,989	16,783	15,176
Four-wheel drive	4,057	2,612	2,537	2,514	2,513	2,429	2,372	2,392
Total Tractors	**95,712**	**108,563**	**105,451**	**102,274**	**96,600**	**96,378**	**97,444**	**109,449**
S-P Combines	9,379	6,744	7,054	7,253	7,323	7,403	6,037	8,792

Source: Farm & Industrial Equipment Institute

Update (from page 5)

DEDEC
DIESEL

Diesel operations set joint venture

Detroit Deere Corp. will be the name of a joint venture of Detroit Diesel Division of General Motors and Deere & Co. The venture will combine the diesel engine operations of both firms and will be based at Livonia, Mich. This is the logo (above) the venture will use. David Hopley, vice-president of Deere's engines group, will be president and Ludvik Koci, a GM vice-president and manager of DDA, will be board chairman of the joint venture.

Industry changes...

Ron Doetch is the new sales manager for **ACRA-Plant Sales, Inc.**, Garden City, Kan. He previously was a sales representative for the company.

New manager of products application and engineering at **Weasler Engineering, Inc.**, West Bend, Wis., is Philip J. Little, and George Goering, formerly with Hesston Corp., is new vice-president of purchasing.

Sundstrand Corp., Rockford, Ill., has appointed David Pfiefle to vice-president of marketing and engineering for the Hydro-Transmission Division. He had headed the division's engineering operations since 1952.

Jim Sullivan has retired after 11 years as vice-president of engine sales, and 35 years total service with **Briggs & Stratton Corp.**, Milwaukee, Wis. Douglas W. Anderson is new sales vice-president for Briggs & Stratton's Engines Division.

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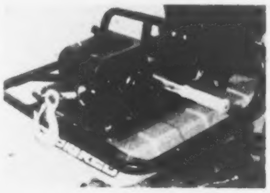
What's new (from page 21)



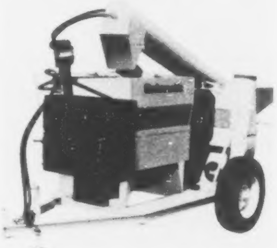
ATV manual winch has 1000-lbs. pulling power

J & M Supply is offering a manual winch for three or four-wheel ATVs. The manually operated ratchet will exert 1000-lbs. of pulling power, without battery drain associated with electric units. It has a heavy steel base plate with bolt hole pattern to fit Honda's Big Red, but can be mounted on any ATV with a front carrier rack using the steel mounting straps supplied. The ratchet handle stores flat on the base plate. The winch is supplied with 30 feet of steel cable with a spring-hasp closing hook. A vinyl cover is also included.

Write In (32) on Reply Card

Automatic mill handles 2400 bph of shelled corn

Automatic Equipment's ATG 2400 roller mill will process up to 2400 bushels of shelled corn per hour. Equipped with a 40-in., 1000 rpm blower, the mill will also deliver processed feed to the top of the highest silo. The 2400 will also handle corn-cob mix, small grains, milo, or silage. Automatic's one-fast-roll principle gives greater capacity with less horsepower and provides self-cleaning action.



Write In (33) on Reply Card

Four-row cotton picker announced by Case IH

Case IH has announced its model 1844 four-row cotton picker that features a basket that raises vertically and "meters" the cotton out, layer by layer, into a module builder or trailer, making what is said to be the most efficient unloading system on the market. This unloading system never shifts the center of gravity of the basket outside the main frame of the picker. The load is always distributed on the entire frame, not just one side, improving stability and reducing metal fatigue failures. Basket capacity is 24.5 cubic meters; picking speed is 5.6 kph.

Write In (34) on Reply Card

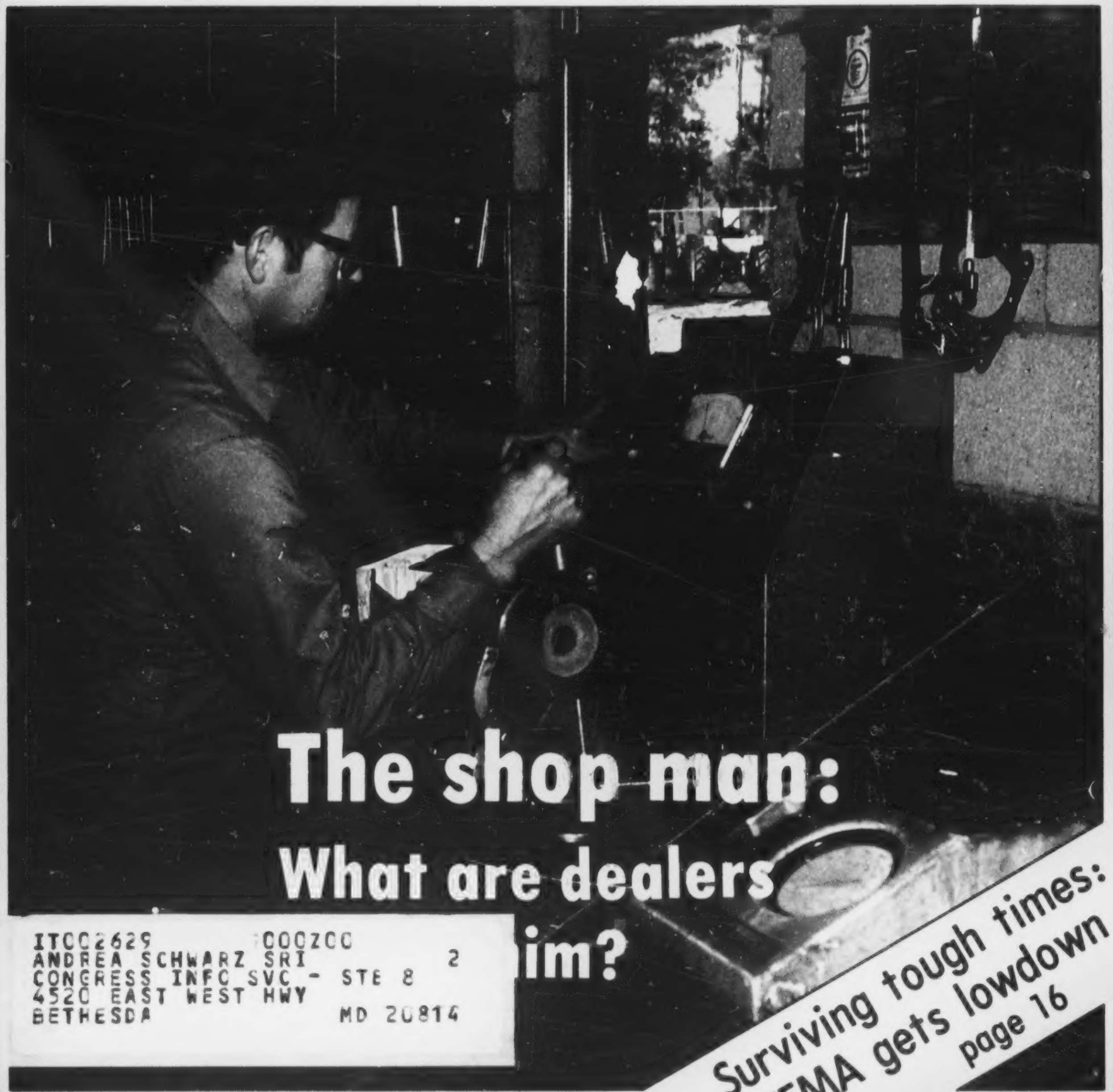
C3450-1
1/20/87

I&T
100
YEARS OF
LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry JANUARY 1987

Obsolete parts can be costly page 18



The shop man:

What are dealers

im?

ITCC2629 COCZCC
ANDREA SCHWARZ SRI 2
CONGRESS INFC SVC - STE 8
4520 EAST WEST HWY
BETHESDA MD 20814

Surviving tough times:
FEMA gets lowdown
page 16

I&T
100
YEARS OF
LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

January 1987 • Vol. 102 • No. 1

Our cover story

What sort of salaries/incentives are the guys in the back shop getting? I&T's survey takes a look at what dealers across the country are paying their personnel. (Pictured: Mechanic Willard Williams, Knightdale Tractor & Equipment Company, inc., Knightdale, N.C.)

14

Features

12: **A dealer needs a well-trained banker.** Today's tough market requires access to credit, and this dealer says a close personal relationship with a banker can pay big dividends.

16: **Survival: What's it going to take** for equipment manufacturers to come out on top in a greatly changed industry? FEMA conventioneers got some advice recently.

18: **How much is it really costing** you to inventory a part? You may be surprised by the figures we present. And you'll learn what constitutes an obsolete part.

22: **A resort area can generate business** for things other than burger franchises and motels. A dealer in the Myrtle Beach area tells how he capitalized on the area's needs to build his business.

24: **What's happened to research and development** during the industry scrunch? It's still around, says author Frank Buckingham, but the bywords for R&D departments are: "Lean and mean."

Departments

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Farm Press Publications, Inc.

AUCTION PRICES

RAY DEAN AUCTION CO.

Dothan, Ala.
October, 1986

(Asterisk beside price indicates highest bid offered on tractors that were not sold.)

CASE TRACTORS

430, 1965 (Fair)	1000

JOHN DEERE TRACTORS

4520, 1970 (Fair)	4300
4020, 1967 (Fair)	3875*
4010, 1962 (Fair)	2675*
4010, 1963 (Fair)	2500*
3020, 1970 (Fair)	4300
2840, 1977 (Good)	5850
2440 (Fair)	4400
2640, 1976 (Fair)	3425
2640, 1978 (Fair)	3725
2130, 1972 (Fair)	1550*
1120, 1972 (Fair)	2800*
1010, 1961 (Fair)	1100*
1010, 1962 (Rough)	700
430, 1960 (Fair)	475*

FORD TRACTORS

8600, 1974 (Fair)	3100
7600 diesel, 1978 (Fair)	4500*
7600, 1976 (Fair)	4100
5000, 1970 (Fair)	3950
5000 diesel, 1968 (Rough)	2600
5000, 1973 (Fair)	4600
5000, 1969 (Rough)	2400*
5000 diesel, 1970 (Good)	4250
5000 diesel, 1975 (Fair)	3875*
5000 diesel, 1972 (Fair)	3200*
4000, 1978 (Fair)	4500
4000, 1976 (Fair)	3300*
4000 diesel, 1975 (Fair)	3375*
4000 diesel, 1971 (Fair)	3500
3000, 1970 (Fair)	2800*
3000, 1968 (Rough)	2300*
3000 diesel, 1970 (Fair)	3000
3000, 1968 (Fair)	2800*
3000 diesel, 1966 (Rough)	1200
801 diesel, 1960 (Good)	2100
TW20 diesel, 1981 (Fair)	9250*
TW20 diesel, 1980 (Fair)	9000*
9N, 1942 (Rough)	1150*
8N, 1950 (Good)	2150
8N, 1951 (Fair)	1350*

INTERNATIONAL HARVESTER TRACTORS

966 diesel, 1971 (Rough)	1550*
674 diesel, 1978 (Fair)	5200
664 diesel, 1972 (Fair)	1850*
664 diesel, 1972 (Fair)	2100*
602 diesel, 1962 (Fair)	2800
574 diesel, 1974 (Good)	4500
574 diesel, 1976 (Fair)	4050*
574 diesel, 1975 (Fair)	2700*
560, 1960 (Rough)	675*
504, 1968 (Rough)	500*

KUBOTA TRACTORS

L225 diesel (Fair)	1800*

LEYLAND TRACTORS

225 diesel (Rough)	800

MASSEY-FERGUSON TRACTORS

1130, 1970 (Fair)	2200*
285 diesel, 1975 (Good)	7650
285 diesel, 1974 (Fair)	4250*
275 diesel, 1980 (Good)	4750
245 diesel, 1979 (Good)	3850
235, 1975 (Good)	4200
255, 1975 (Good)	4000*
175, 1976 (Fair)	2800
175 (Fair)	2300*
175, 1976 (Fair)	2800
175 diesel, 1973 (Fair)	2500*
175, 1975 (Fair)	2550*
175 diesel, 1973 (Fair)	2375*
165 diesel, 1969 (Fair)	2500*
165, 1968 (Fair)	2900
135, 1970 (Fair)	3100
135 diesel, 1969 (Good)	2850*
135 diesel, (Fair)	3450
135 diesel, (Fair)	3000*
135, (Fair)	3300
135, 1968 (Good)	4000
135 diesel, 1969 (Fair)	2850*
135 diesel, 1970 (Fair)	2650*
65, 1960 (Rough)	1100
65, 1963 (Fair)	1400
65, 1964 (Fair)	2330
50, 1962 (Good)	1250*
50, 1964 (Good)	1400
40, 1970 (Fair)	1600
35, 1963 (Fair)	1425
35, 1960 (Fair)	1375
35, 1963 (Rough)	2000
35, 1962 (Good)	1925

YODER & FREY, INC.

Archbold, Ohio
Nov. 11, 1986

ALLIS CHALMERS TRACTORS

G, 1950 (Fair)	650*
7000 diesel, 1979 (Good)	5600*
7030 diesel, 1980 (Good)	6100

CASE TRACTORS

430 (Fair)	1475
830 diesel, 1964 (Rough)	950*
930, 1968 (Fair)	3100*
1070 diesel, 1972 (Fair)	3800*
1370 diesel, 1977 (Fair)	5300
1690 diesel, 1982 (Good)	7500*
2670 diesel, 1976 (Rough)	8000*

JOHN DEERE TRACTORS

A, 1945 (Fair)	425
A, 1946 (Rough)	400*
1530 w/ldr., 1974 (Fair)	4500*
3020, 1968 (Fair)	2600*
3020 diesel, 1966 (Fair)	3250
3020 diesel, 1970 (Fair)	4200
3020 diesel, 1967 (Fair)	3100*
2840 diesel, 1979 (Good)	5600*
4020 diesel, 1965 (Fair)	4200*
4020 diesel, 1966 (Good)	5750
4020 diesel, 1966 (Fair)	4900
4020 diesel, 1965 (Fair)	5100*
4020 diesel, 1967 (Fair)	5300*
4020 diesel, 1970 (Fair)	5250*
5020 diesel, 1972 (Fair)	3100*
4230 diesel, 1976 (Fair)	7300*
4240 diesel, 1981 (Good)	13,250*
4320 diesel, 1973 (Good)	6000*
4430 diesel, 1977 (Good)	9400*
4430 diesel, 1974 (Good)	8500
4430 diesel, 1977 (Good)	9500*
4520 diesel, 1972 (Rough)	2500*
4630 diesel, 1975 (Good)	8250*

FORD TRACTORS

9N, 1946 (Rough)	1050*

(See Auctions, pg. 20)

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Write In (11) on Reply Card

INDUSTRY UPDATE

Thanks for the overtime

Which sales persons across the U.S. stayed open late Saturday, November 30 and closed the last 18 deals on under-40 hp tractors? Whoever they are, the industry is grateful, for without them, *every* category of product in the Farm & Industrial Equipment Institute's November retail sales flash report would have shown a decline from the levels of November, 1985.

	Unit Retail Sales					
	November			January-November		
	1986	1985	%	1986	1985	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	3,083	3,065	.6	57,732	53,768	7.4
40 & Under 100 HP	1,888	2,277	(17.1)	28,370	35,262	(19.5)
100 & Under 140 HP	355	366	(3.0)	4,801	6,803	(29.4)
140 HP & Over	569	887	(35.9)	8,687	9,653	(10.0)
Total 2-Wheel Drive	**5,895**	**6,595**	**(10.6)**	**99,590**	**105,486**	**(5.6)**
4-Wheel Drive						
Under 200 HP	55	92	(40.2)	511	830	(38.4)
200 HP & Over	165	137	20.4	1,293	1,547	(16.4)
Total 4-Wheel Drive	**220**	**229**	**(3.9)**	**1,804**	**2,377**	**(24.1)**
Total Farm Wheel Tractors	6,115	6,824	(10.4)	101,394	107,863	(6.0)
Combines (Self-Propelled)	610	1,136	(46.3)	7,179	7,488	(4.1)
Balers (Bales under 200 lbs)	171	245	(30.2)	5,516	6,801	(18.9)
Forage Harvesters (Shear Bar Type)	147	194	(24.2)	2,038	2,348	(13.2)
Mower Conditioners	414	478	(13.4)	10,469	10,836	(3.4)

Deere cites diversification moves

A recent issue of JD Journal, a publication for Deere & Co. employees, outlined the company's four basic enterprises beyond farm, industrial, and consumer-type equipment.

An article, "Four New Ways to Profit," discussed the chassis businesses, the financing of a variety of farm-oriented retail buying, a health plan, and component supply.

Deere now has one of three assembly lines at its Waterloo Tractor Works devoted to the assembly of recreational vehicle chassis. Supplying 20 different manufacturers of RVs, Deere produced about 1,000 units in 1986 and up to 10,000 annually in several years. Deere hopes to broaden this business to making chassis for light buses and city delivery trucks.

Deere bought Farm Plan, a revolving credit system for rural merchants, in 1985, and reports 1,700 merchants currently using it in 29 states. It should be in place in 48 states by the end of 1987. There are currently 100 employees at the Madison, Wis., headquarters and in eight field offices.

Ron Carne, Farm Plan president, estimates that rural merchants — implement dealers, chemical dealers, veterinarians, etc. — probably do $50 billion in sales yearly and that Farm Plan currently has about 2 percent — $200 to $250 million — of this volume.

Deere set up Heritage National Healthplan, Inc., in 1985 as a subsidiary. According to its president, Lloyd Mathwick, it is an alternative health care delivery system.

In 1970, Deere had set up a group claims operation to administer benefits, and has since established alternative health care delivery systems in the Quad Cities and Waterloo. The plan is currently certified in Iowa, Illinois, and Tennessee.

Deere has been marketing components to OEMs for over 20 years, but it began pushing these operations strongly in 1981. In addition to making chassis at the Tractor Works, the Components Group casts engine blocks at the Waterloo Foundry for passenger cars, and the Harvester Works makes fuel pumps for automobiles.

New products include hydraulic pumps, hydraulic motors, and new axle versions. Biggest volume line is the diesel engine, and Deere also sells processes such as heat treatment and screw machining.

Southern associations hold joint sessions

The Mid-South Farm Equipment Association, based in Memphis, and the Deep South Equipment Dealers Association, Baton Rouge, La., are holding their conventions concurrently January 22-25 at the New Orleans Marriott hotel. It is believed to be an industry first, although neighboring associations have conducted joint projects in the past. The recent conference on business planning, held at Virginia Tech, was participated in by dealers from the Virginia Farm & Industrial Equipment Dealers Association and the Mar-Del-Va Farm & Power Equipment Association.

FEMA restricts membership of overseas firms

The Farm Equipment Manufacturing Association has altered its rules of membership for companies based outside North America.

According to Robert Schnell, executive vice-president, FEMA has set up a foreign member section for companies not manufacturing in North America, but who have North American product liability coverage or bonding and a U.S. sales office.

Membership status of overseas member firms that manufacture or assemble in North America will not be affected.

Schnell said the change is not an attempt to force overseas members out of the organization, "though some will undoubtedly drop out."

He said FEMA's executive board made the change because "it is unfair if a farmer using an overseas-made product is injured and has no recourse except in foreign courts."

Companies in the Foreign Member Section, Schnell said, will receive the same services as others, but will not have voting rights.

FEMA is based at 243 N. Lindbergh Blvd., St. Louis, Mo. 63141, telephone 314/991-0702.

NFPEDA to show model store at Lawn-Garden Expo

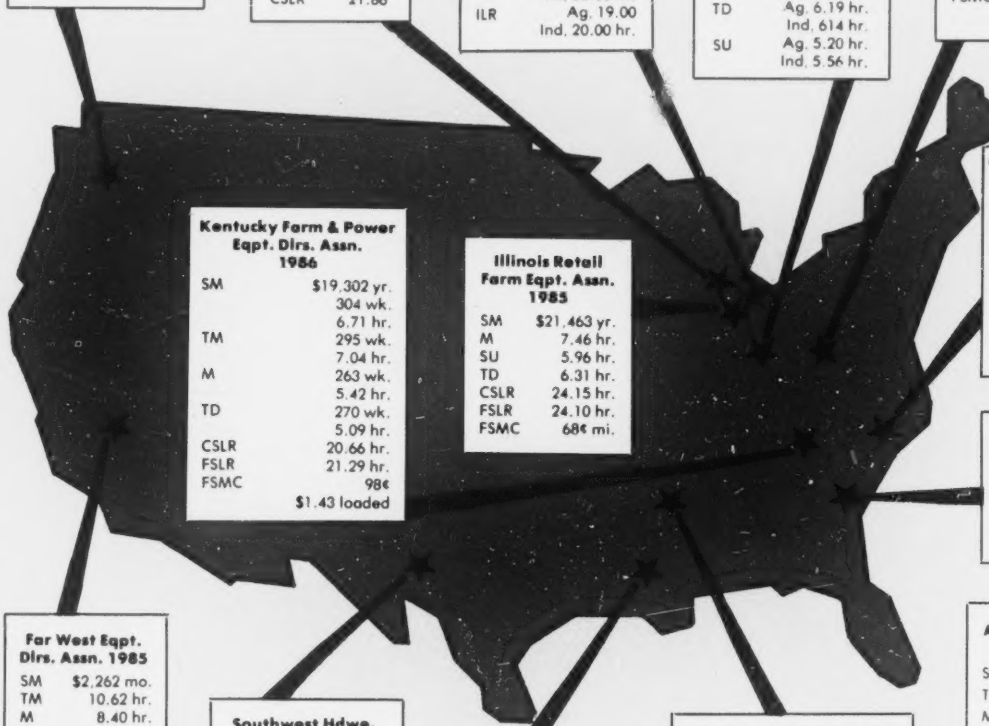
The National Farm & Power Equipment Dealers Association will put up and staff a model store at the International Lawn, Garden & Power Equipment Exposition July 27-29 at Louisville, Ky.

According to Tom Glaub, manager of NFPEDA's Outdoor Power Equipment Division, the model is intended to demonstrate efficient traffic patterns and effective merchandising. The model store will also feature a computer system for parts inventory and computer-aided store designs.

WHAT ARE THEY PAYING THE GUYS IN THE SHOP?

I&T sums up the most recent surveys of 13 state and regional farm/industrial equipment dealer associations

By Bill Fogarty



Pacific Northwest Hdwe. & Impl. Assn. 1985

SM	$11.67 hr.
TM	10.48 hr.
M	9.06 hr.
AM	7.15 hr.
SU	7.19 hr.
TD	8.33 hr.

Wisconsin Farm Eqpt. Assn. 1985

SM	$8.23 hr.
TM	7.55 hr.
M	6.32 hr.
SU	5.59 hr.
TD	6.13 hr.
CSLR	21.86

Michigan Eqpt. Dealers Assn. 1985

SM	$9.30 hr.
TM	8.20 hr.
M	7.00 hr.
SU	6.00 hr.
TD	6.46 hr.
CSLR	Ag. 23.00 hr. Ind. 25.00 hr.
ILR	Ag. 19.00 Ind. 20.00 hr.

Ohio Assn. of Farm & Power Eqpt. Retailers 1986

SM	Ag. $8.16 hr. Ind. $8.33 hr.
TM	Ag. 7.39 hr. Ind. 7.75 hr.
M	Ag. 6.04 hr. Ind. 6.64 hr.
TD	Ag. 6.19 hr. Ind. 614 hr.
SU	Ag. 5.20 hr. Ind. 5.56 hr.

Fennsylvania Farm & Power Eqpt. Dlrs. Assn. 1986

SM	$18,706 yr. 7.52 hr.
TM	16,709 yr. 6.79 hr.
M	16,205 yr. 6.14 hr.
TD	13,430 yr. 6.01 hr.
CSLR	19.54 hr.
FSLR	21.08 hr.
FSMC	68¢ small truck 97¢ big truck

Kentucky Farm & Power Eqpt. Dlrs. Assn. 1986

SM	$19,302 yr. 304 wk. 6.71 hr.
TM	295 wk. 7.04 hr.
M	263 wk. 5.42 hr.
TD	270 wk. 5.09 hr.
CSLR	20.66 hr.
FSLR	21.29 hr.
FSMC	98¢ $1.43 loaded

Illinois Retail Farm Eqpt. Assn. 1985

SM	$21,463 yr.
M	7.46 hr.
SU	5.96 hr.
TD	6.31 hr.
CSLR	24.15 hr.
FSLR	24.10 hr.
FSMC	68¢ mi.

Mar-Del-Va Farm & Power Eqpt. Assn. 1986*

SM	$22,895 yr. 10.13 hr.
M	19.793 yr. 8.06 hr.
MH	12,803 yr. 5.36 hr.
TD	13,621 yr. 5.60 hr.

*Only six replies.

Carolinas Farm & Power Eqpt. Dlrs. Assn. 1984

SM	$18,169 yr.
M	6.50 hr.
MH	4.96 hr.
CSLR	20.25 hr.

Far West Eqpt. Dlrs. Assn. 1985

SM	$2,262 mo.
TM	10.62 hr.
M	8.40 hr.
TD	8.80 hr.
CSLR	30.50 hr.
FSLR	33.00
FSMC	44¢

Southwest Hdwe. & Impl. Assn. 1985

SM	$1,804 mo. 417 wk.
TM	9.29 hr.
M	7.39 hr.
SU	5.57 hr.
TD	6.27 hr.
CSLR	25.93 hr.
ILR	23.70 hr.
SULR	21.11 hr.
FSLR	28.44 hr.
FSMC	91¢ (75¢ r.t.)

Deep South Eqpt. Dealers Assn. 1985

SM	$1,742 mo.
TM	8.61 hr.
M	6.70 hr.
SU	6.00 hr.
TD	6.41 hr.
CSLR	25.31 hr.
FSLR	25.23 hr.
FSMC	53¢ mi.

Mid-South Farm Eqpt. Assn. 1986

SM	$1,573 mo. 363 wk.
TM	7.48 hr.
M	8.52 hr.
SU	4.87 hr.
TD	5.62 hr.
CSLR	22.23 hr.
ILR	19.23 hr.
SULR	18.36 hr.
FSLR	22.22 hr.
FSMC	1.00/53¢ r.t.

ABBREVIATIONS CODE

SM	Service Manager
TM	Top Mechanic
M	Mechanic
MH	Mechanic's Helper
AM	Apprentice Mechanic
SU	Set-Up Worker
TD	Truck Driver
Ag	Agricultural Dealer
Ind	Industrial Dealer
CSLR	Customer Service Labor Rate
ILR	Internal Labor Rate
SULR	Set-up Labor Rate
FSLR	Field Service Labor Rate
FSMC	Field Service Mileage Charge

Notes: Some associations showed wages and rates broken out by size of dealership, but did not present a combined average. On these, I&T averaged the breakouts. Sorry, our map omits Alaska and Hawaii. Future issues of I&T will give data about parts personnel wages and salaries and focus some information on sales personnel.

WE'RE LOOKING FOR A FEW GOOD DEALERS!

We've got the products and we help you sell with liberal terms, co-op advertising and sales aids. And, we'll be here tomorrow to service what we sell today.

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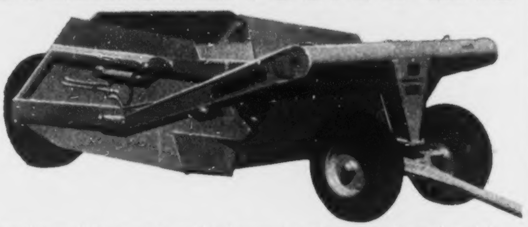

Designed to work with farm tractors to level fields, fill gullies, build dams, etc. Built rugged for minimum upkeep. Capacity from ½ to 14 cu. yd. for tractors from 12 h.p. and up.

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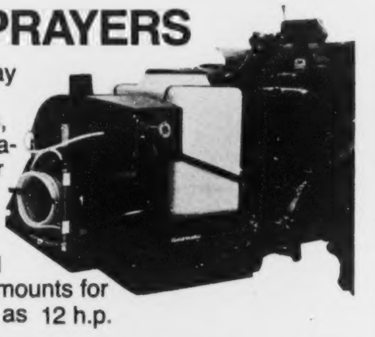

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Automatic

Call toll free 800-228-9289, ask for Ike. In Nebr (402) 385-3051

Write In (19) on Reply Card

LITERATURE

Excel Industries, Inc. has produced a new 16-page brochure that tells the story of its productive innovation in the full line of professional-quality Hustler rotary mowers, attachments, and accessories. Included in the literature is the complete line of Hustler mowers, along with a number of attachments.

Write In (20) on Reply Card

Bunton Co. has released a new full color specification brochure on its line of heavy duty commercial rotary mowers. Mid-size mowers are available in seven cutting widths. All widths offer the traditional side discharge chute. The 36-inch and 52-inch models are available in a mulching design. A choice of lawn or turf front casters on many of the models allows the operator to customize units for the terrain being mowed.

Write In (21) on Reply Card

The new, revised "Farm Equipment Guide Quick Reference Guide" is available. The annual edition provides reliable information on tractors, combines, and crawlers. Also available from **Hot Line, Inc.** is the monthly "Farm Equipment Guide," which lists results of farm machinery auctions nationwide.

Write In (22) on Reply Card

Auction prices *(from page 9)*

9N w/ldr., 1941 (Rough)	930
Jubilee, 1954 (Rough)	1625*
860, 1956 (Rough)	1900*
4000 diesel, 1972 (Fair)	3100*
4000 diesel, 1972 (Fair)	3100*
5000 diesel, 1971 (Fair)	3200*
5000 diesel, 1971 (Good)	4500*
7000 diesel, 1974 (Exc.)	7000*
8600 diesel, 1976 (Fair)	4950*
INTERNATIONAL HARVESTER TRACTORS	
H, 1949 (Rough)	450*
H, 1952 (Rough)	500*
H, 1946 (Rough)	450
H, 1944 (Fair)	525*
H, 1949 (Rough)	630
M, 1950 (Rough)	425*
M, 1949 (Fair)	575*
460, 1960 (Fair)	1300
1456 diesel, 1969 (Good)	5500*
1466 diesel, 1974 (Fair)	7500*
1466 diesel, 1972 (Fair)	6000*
706 diesel, 1963 (Fair)	2200*
706 diesel, 1965 (Fair)	2825
756 diesel, 1968 (Rough)	2600*
766 diesel, 1974 (Fair)	6000*
856 diesel, 1970 (Good)	4800*
966 diesel, 1975 (Fair)	5800*
966 diesel, 1976 (Good)	7000*
986 diesel, 1980 (Good)	10,300
1066 diesel, 1974 (Fair)	6500*
1066 diesel, 1974 (Good)	7200*
1086 diesel, 1981 (Fair)	12,500*
1206 diesel, 1964 (Rough)	2200*
1566 diesel, 1974 (Fair)	5750*
1586 diesel, 1979 (Exc.)	9250*
H100 diesel, 1967 (Fair)	4000*
3788 diesel, 1980 (Good)	12,000*
MASSEY-FERGUSON	
35, 1961 (Fair)	1500*
65 diesel, 1960 (Rough)	1600*
65, 1958 (Fair)	1700*
1130 diesel, 1967 (Good)	4100*
1135 diesel, 1976 (Rough)	5250*
1150 diesel, 1971 (Fair)	3750*
2705 diesel, 1981 (Exc.)	8250*
MINNEAPOLIS-MOLINE TRACTORS	
G-1000 LP, 1970 (Rough)	1400*
G-1000, 1969 (Rough)	2250*
G-1000 diesel, 1970 (Fair)	2800*
OLIVER TRACTORS	
77, 1951, (Rough)	400*
1650 diesel, 1968 (Fair)	3050*
1755 diesel, 1973 (Fair)	4200*
1755 diesel, 1972 (Fair)	3100*
1955 diesel, 1973 (Fair)	4000*
WHITE TRACTORS	
4-150 diesel, 1974 (Fair)	9500*

NOTES:
Prices reported are for individual sales at wholesale on an "as is," "cash and carry" basis. Prices reported are not averages.

Condition Classifications:

EXCELLENT: Engine in perfect condition, 400 to 600 hours of use. Rubber—80% tread remaining, no breaks or cracks. Paint—original and bright. General appearance: excellent.

GOOD: Engine in good running condition. Rubber—70% tread remaining, no breaks or cracks. Paint—original or a good repaint job. General appearance; good over-all.

FAIR: Engine possibly in need of a minor overhaul. Rubber—60% tread remaining, some cracking evident in sidewalls. Paint—only fair, weathered and some rust apparent. General appearance; worn, some dents, minor parts (gage covers, etc.) missing or broken.

ROUGH: Engine obviously in need of a major overhaul. Rubber—smooth. Paint—scarred, weathered, rusty. General appearance: dents, ruptures, broken parts, loose wires, components (such as lights) broken, missing or inoperative.

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry FEBRUARY 1987

How Deere dealers are coping page 8

Tillage, planting, spraying: Searching for answers

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FIEI forecast:
Tough '87, better '88
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I&T 100 YEARS OF LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

February 1987 • Vol. 102 • No. 2

Our cover story

Farmers want to cut production costs, but when it comes to shelling out money for new tillage, planting, and spraying systems, they're saying, "Show me it will work on my farm." I&T takes a look at changes on the spraying/tillage scenes. (The tillage equipment photos are courtesy of Case-IH.)

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Features

8: **The verdict on the Deere strike:** Dealers are coping well in their parts operations, despite some delays. Cooperation is good, respect for Deere is high.

10: **Partsmen: How much do they make?** I&T's survey of 13 dealer associations takes a look at the salary/benefit programs for these employees.

16: **Changes in tillage equipment** find dealers on the cutting edge in offering equipment needed to reduce costs and maintain production efficiency.

22: **What's ahead for the farm equipment industry?** FIEI's forecast sees a "tough" 1987, a "better" 1988.

24: **The big transition** in agricultural spraying equipment, and the forces that are fueling the change, are examined by I&T Editor Bill Fogarty.

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Farm Press
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Soft December winds up '86

The flash report of the Farm & Industrial Equipment Institute shows Santa Claus having bypassed most product categories for December. If tax credit was a buying motive for some farmers, it was not reflected in overall sales performance. Japanese-built tractors (under 40 hp) scored their usual successes, and mower-conditioners finished the year almost even.

	Unit Retail Sales					
	December			January-December		
	1986	1985	%	1986	1985	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	3,748	3,491	7.4	61,483	57,259	7.4
40 & Under 100 HP	2,424	2,580	(6.0)	30,794	37,842	(18.6)
100 & Under 140 HP	331	497	(33.4)	5,132	7,300	(29.7)
140 HP & Over	438	747	(41.4)	9,126	10,400	(12.3)
Total 2-Wheel Drive	6,941	7,315	(5.1)	106,535	112,801	(5.6)
4-Wheel Drive						
Under 200 HP	97	257	(62.3)	601	1,087	(44.7)
200 HP & Over	157	278	(43.5)	1,449	1,825	(20.6)
Total 4-Wheel Drive	254	535	(52.5)	2,050	2,912	(29.6)
Total Farm Wheel Tractors	7,195	7,850	(8.3)	108,585	115,713	(6.2)
Combines (Self-Propelled)	486	923	(47.3)	7,650	3,411	(9.0)
Balers (Bales under 200 lbs)	234	237	(1.3)	5,751	7,038	(18.3)
Forage Harvesters (Shear Bar Type)	126	112	12.5	2,164	2,460	(12.0)
Mower Conditioners	484	407	18.9	10,954	11,243	(2.6)

Ford New Holland taking shape

Ford New Holland Inc. is the name of the newly formed subsidiary that began existence Jan. 1. It's a restructuring of Ford Tractor Operations and New Holland Inc. by Ford Motor Co. and its world headquarters will be in New Holland, Pa. The consolidation is expected to be completed in the latter part of 1987.

There are three major product components in the new organization — Tractor Operations, New Holland and Diesel Engine Operations. Tractor and Diesel Engine Operations will be based in Troy, Mich., their present location, and New Holland will be at its present base in the city of New Holland. The master tractor parts depot and a branch sales office will remain in Troy.

Sales and marketing of Tractor Operations and New Holland will be handled by a single group based in New Holland, starting early in 1987. Supply, finance and personnel functions will also be consolidated in the new enterprise.

Officers: Robert F. Moglia is president of Ford New Holland, report to Edson P. Williams, Ford Motor's vice-president of diversified products. Moglia had been general manager of Ford Tractor Operations. Reporting to Moglia:

H.G. McCarty, who continues as president of New Holland Inc., responsible for New Holland business worldwide and for Ford New Holland Operations in Australia.

Robert E. Gerrity, vice-president, Tractor and Diesel Engine Operations, managing the worldwide tractor and diesel engine business and all Ford New Holland activities in Brazil. He had been assistant general manager for product development, manufacturing and supply for FTO.

Gorham A. Cowl, vice-president, sales and marketing of Tractor Operations and New Holland products worldwide. He had been assistant general manager of sales and marketing for FTO.

In the first quarter of 1987, New Holland parts facilities will be relocated from Memphis, Tenn., Arlington, Texas, and St. Paul, Minn., to Ford Tractor parts depots at Memphis, Dallas and Minneapolis, respectively. Later, NH's parts facility at Columbus, Ohio, will be relocated into Ford's at Troy. Other parts consolidations are still

(See Subsidiary, pg. 29)

Canadian outlook: sales decline expected in '87

Canadian manufacturers are anticipating a decline in retail sales of most equipment types, according to the Canadian Farm & Industrial Equipment Institute, though not as severe as 1986's volume loss.

Sales of all wheel-type tractors in Canada in 1986 were estimated at 18,066 units, down about 9 percent from 1985. For 1987, they predict sales of 17,344 tractors, down another 4 percent.

Sales of tractors under 40 horsepower are expected to hold steady; 40-99-horsepower tractors are predicted to go down 4 percent; tractors over 100 hp, down 8.5 percent; and four-wheel drive tractors to hold at slightly under the 1986 level.

In 1986, self-propelled combine sales were an estimated 2,580 units, but the forecast calls for a decline to 2,113 units in 1987.

Other forecasts: Balers (bales under 200 lbs.) from 1986's 1,719 units to 1,657 in 1987; large-bale models; 2,926 in 1986, 2,073 in 1987. Mower-conditioners: From 2,250 units in 1986 to 2,169 in 1987. Self-propelled swathers: 1,807 units in 1986, 1,735 in 1987.

Imports top exports for nine months

For the first nine months of 1986, farm equipment imports topped exports. Imports were valued at $1.271 billion; exports were $1.158 billion, down 19 percent from the first three quarters of 1985.

Major customers for U.S. farm equipment, their volumes and percentages of increase or decline from the same nine months of 1985 were:

Canada — $518 million, down 15 percent; Mexico — $65 million, down 64 percent; Venezuela — $44 million, up 57 percent; West Germany — $48 million, up 27 percent; Belgium — $31 million, up 86 percent.

Brazil — $13 million, up

(See Exports, pg. 29)

FIEI sales forecast:

Tough in 1987, better in 1988

By Bill Fogarty

HOW DOES IT LOOK for 1987?

The collective judgment of 30 marketers of field-type farm equipment is for a modest — 2.8 percent — improvement in U.S. retail sales volume. That's how the forecast of the Farm & Industrial Equipment Institute's Farm Equipment Division sees things.

The actual range of outlooks among the 30 executives is, as in past years, very broad; however, the majority expect conditions to produce a sales volume of plus-or-minus five percent. There are two who see an improvement of 10 to 12 percent and four others who see a decline of from 10 to 15 percent.

Generally speaking, 1987 generates a mixed outlook. More items are expected to show a unit sales decline than an increase. However, 1988 is another story. Only two products are expected to decline in 1988 from 1987; the others are expected to increase in volume or hold even.

Tractors: Under 100 horsepower units are expected to do well in 1987; bigger models, including four-wheelers, are figured for further decline. In 1988, all tractor categories are expected to improve.

Sales of tractors under 40 horsepower crossed the 60,000-unit line in 1986, according to FIEI retail sales reports, and the marketers are counting on continued moderate increases in the next two years. Tractors of from 40 to 99 horsepower had a substantial sales drop in 1986, but the forecasters expect a good rebound this year and next.

Grain harvesting equipment: Marketers of combines and corn heads are bracing for severe declines in 1987, followed by resurgence in 1988 which, though welcome, will not bring volume back to the 1986 level.

Haying equipment: Hay tools are expected to hold their own or improve slightly in 1987 and again hold steady in 1988. Survey participants are talking about an increase in big baler sales of a median 2.7 percent, while two of the seven participants in that part of the forecast are looking for a 10 percent rise this year. And one windrower marketer anticipates a 24 percent upswing.

Tillage products: Marketers of tillage equipment are generally less

(See FIEI, pg. 28)

U.S. Retail Sales Forecast 1987-1988 (in units)

Product	Actual Sales, 1985	Actual Sales, 1986	Sales Forecast for 1987	Sales Forecast for 1988
Farm Tractors				
Under 40 HP	57,214	61,483	62,713	63,779
40-99 HP	37,847	30,794	32,303	33,142
100 HP and over	17,700	14,258	13,574	14,741
4-wheel drive	2,912	2,050	1,978	2,126
Total Farm Tractors	115,673	108,585	110,568	112,788
S-P Combines	8,411	7,650	6,411	6,847
Corn Heads	5,016	4,840E	4,056	4,397
Forage Harvesters[1]	2,460	2,164	2,114	2,114
Balers, square[2]	7,038	5,751	5,751	5,751
Balers, round[3]	9,637	9,100E	9,346	9,346
Windrowers	2,026	1,500E	1,500	1,550
Mower-Conditioners	11,243	10,954	11,325	11,325
Grinder-Mixers	1,914	1,600E	1,776	1,671

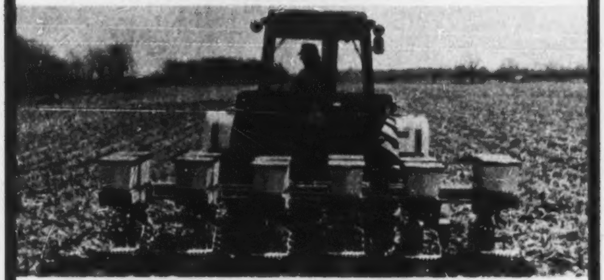
E: Estimated [1]Shear-bar type [2]Bales under 200 lbs. [3]Bales over 200 lbs.
Source: Farm & Industrial Equipment Institute.

Other Product Retail Sales Forecasts 1987-1988

Product	Percent of Change: 1987 from 1986	Percent of Change: 1988 from 1987
Augers, elevators	-12.5	0
Crop dryers, in-bin	-15.0	0
Crop dryers, batch and continuous flow	0	0
Dairy and beef equipment	0	+ 5.0
Hog equipment	+ 3.0	+ 2.0
Grain bins	-15.0	-5.0
Milking machines	+ 3.0	+ 2.5
Manure spreaders	-5.5	-1.7
Disk harrows	-1.9	0
Field cultivators	-3.8	0
Chisel plows	-4.8	0

Source: Farm & Industrial Equipment Institute

Buffalo
Clearly, on top.



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INVENTORY WATCH

What's happening to stockpiles in relation to sales.

Equipment	Inventory Levels Oct. 31, 1985	May 31, 1986	June 30, 1986	July 31, 1986	Aug. 31 1986	Sept. 30 1986	Oct. 31, 1986	12-Month Sales, Nov. 1, 1985 Oct. 31, 1986
Tractors								
Under 40 hp	41,153	54,041	52,089	50,905	52,872	57,108	57,880	61,160
40-99 hp	26,455	27,319	25,751	26,055	25,417	24,915	24,774	31,394
100 hp and over	23,171	18,400	16,247	16,989	16,783	16,299	14,901	15,061
Four-wheel drive	3,601	2,514	2,513	2,429	2,372	2,247	2,092	2,350
Total Tractors	**94,380**	**102,274**	**96,600**	**96,378**	**97,444**	**100,569**	**98,647**	**109,915**
S-P Combines	8,353	7,253	2,323	7,403	6,037	5,624	4,560	7,628

Source: Farm & Industrial Equipment Institute

Deere Strike *(from 9)*

much machinery was tired, after working too many hours."

Richard C. Perkins, Brazos Machinery Co., Bryan, Texas, said his dealership is getting its parts anywhere and everywhere it can right now. "I wouldn't say we have an agricultural parts shortage, but I would say we sure have a parts delay, maybe 14 to 21 days. The sad thing is, new and used parts are being sold at least at list price (by some dealers to others), not at dealer net price, and all costs such as freight are being passed on to the customer."

Dennis Pilati, Mid Cal Tractor, Stockton, Calif., echoed Perkins' feelings. A few dealers he deals with, maybe five percent, sell parts to other dealers at retail. "That, along with shipping expense, must be absorbed, though we are not trying to pass on our problems to the customer. Most dealers, though, are very cooperative."

How about parts for Deere equipment made at unaffected factories? Pilati observed that the problems there are marginal. "For example," he explained, "Japanese-made hydraulic valves for equipment made there are stored in Deere's U.S. depot. But if clerks are busy hustling Deere product parts, they may not be able to get these other stocks as readily."

Pilati estimated his stocks were about 30 percent below normal. "I believe all dealers will be in the same position soon if this strike continues much longer."

Steve Scharber, Scharber & Sons, Rogers, Minn.: "We ran into a few problems; some parts were harder to locate. But we weren't tied up in the fall season. We've not had to do any more robbing of parts from machines on our lot than we would under usual conditions. Winter's on us now, but we'll get busy about March 1."

Terry Barbee, Barbee-Neuhaus Implement Co., Weslaco, Texas, said his parts sales volume is off 28 percent from a year ago, but he was not sure how much of the downturn was related to strike-induced shortages.

"Really, we've seen a good spirit of cooperation between our dealership and Deere, and between dealers direct," said Barbee, "But we will feel a lot more pressure if parts are still hard to find when farmers' busy season rolls around."

Doug Naismith, Briggs Equipment Co., Suffolk, Va., said: "Now we are trying to do winter inspections and tractor repairs. Out biggest headache is finding gaskets. Part of our inspection is valve clearance, but since we can't replace the valve cover gasket, we can't do that part of our inspection.

"The strike has helped us clear a lot of old parts. In a sense, it has helped our cash flow: We don't have as much money tied up in inventory."

A major concern of Naismith's: "If the strike continues long after the first of the year, we could have a big problem. It will take two or three months to refill the parts and equipment pipelines."

David Bartch, parts manager at Valley Truck & Tractor, Yuba City, Calif., noted that emergency

(See Deere, pg. 28)

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Editor's Notebook *(from 7)*

while, appears to be that if American agriculture is going to dwindle to 100,000 or so prime customers for new equipment by 1993 (or pick your own number and year), the companies are going to have to know everything possible about them — who and where they are, how they think about their farming practices, their machinery operating habits, their convictions about brands, their wives' influence, anything that will give them a marketing edge.

It's no wonder that they feel they have to get closer to this customer, whether he's a surviving farmer or a contractor or a suburb-dwelling hobby farmer. There was a time when all their customers were farmers; all they had to sell was iron, and the blockman system of maintaining a flesh-and-blood presence beside the dealer worked just fine.

It isn't sufficient today.

One example of working to get closer to customers: Massey-Ferguson formed the MF Club last year as a means not only of selling additional things to the buyer, such as insurance, travel services and merchandise, but also to serve as a means of learning more about him. Another example: Deere's acquiring of Farm Plan, the rural retail financing operation, seems to be another move to establish a relationship with more of the surviving customer base.

Some upshots

These manufacturer moves to get closer to the customer have to have some impact on dealers, even if there is little or no total bypassing of them on service-oriented machinery.

One thing that seems likely to happen is the ascendancy of the product specialist. If manufacturers have to keep their blockmen busy shuffling papers and counting beans, they are going to have to field a fleet of dazzling product experts — people who can set up that demonstration and win brilliantly, people who can show prospects how to use the machine to maximum advantage and who know how to help the dealer pull a good crowd together to see it all.

And the level of market research seems destined to get better. It has to. The market pundits who led their companies into wrong decisions about products and production levels will have to give way to a new breed who knows how to find that real combine prospect and learn what is really going to motivate him.

If manufacturers are going to pour money into getting themselves to new levels of intimacy with customers, and in effect take on some of the retailer's selling function, one has to wonder what changes this will have in the dealer discount structure. If the retail salesman's function is reduced to wrestling the prospect to the ground until the product specialist can be summoned to close the deal, something has to be different, doesn't it?

And if we're looking at a world in which dealers get to keep less wholegoods margin than in the past, then where will more profit have to come from? Where else but parts and service?

All the whiz-bang demonstrating and promotional efforts of any manufacturer will lay a big egg if there is no customer perception of a good parts operation — a clicking service department and an adequate level of product knowledge on the retail level. Dealerships that can't manage a decent parts turnover, can't charge out enough servicemen's hours, or answer those everyday questions about product application will be hard put to survive.

If I were a dealer, I wouldn't worry much about some manufacturer trying an end run around me. If he did, I and all my neighboring in-line dealers would look for suppliers with more long range vision.

Instead, I'd worry about how I might be able to set up a parts and service branch that could make a *profit*. Or I'd worry about which shortlines would work best in my territory with my basic franchise. Or I'd worry about the best incentive programs for my employees.

I'd worry about which employees (including myself) I'd be best advised to send off to product schools, sales schools, service schools, and management schools. That's because I'd feel dealer survival is far more closely tied to that kind of performance than it is to manufacturers' approaches to distribution.

You see, manufacturers ultimately will always need dealers to get the product in the users' hands. But not just any dealers will do. ☐

FIEI forecast *(from 22)*

upbeat about the next two years. They are looking for declines this year in disk harrow sales (1.9 percent), field cultivators (3.8 percent) and chisel plows (4.8 percent). They expect no change in 1988 from 1987 performance.

Farmstead lines: Twenty-five member companies of the FIEI's Agri-Equipment Division participated in the survey. They see a general retail sales outlook for their products this year as a median zero, i.e., finishing about even with 1986. The range runs from one optimist seeing a 10 percent improvement to four who expect a 10 percent decline.

Forecast rules, accuracy

FIEI asks participants in its State of the Industry study to estimate unit retail sales only on those products with which they are involved, and to estimate what they think the *whole industry*, not just their own company's products, will do in the marketplace.

Nevertheless, some marketing executives have told I&T privately they only estimate what their own company will do, and some have said they always overstate their estimate in order to provide a "more positive" look to the forecast.

Other industry executives have urged their colleagues sometimes in speaking to the FIEI Marketing & Management Conference, to give a high priority to the State of the Industry survey and to work harder, within the survey rules, to make it a more valuable tool for the industry at large.

In the recent years of market decline, participating marketers have generally overestimated actual sales performance, though some predictions have been very close. The market for tractors of less than 40 horsepower has been consistently underestimated, however. ☐

Deere Strike *(from 27)*

parts can arrive at his shop within four or five days, rather than two or three. "But that four or five days is quicker than it was earlier in the strike. It appears Deere has done something to speed things up," he said.

Inventory items that are dropping furthest include bearings and other fast-moving items. He said he does shop TISCO and other such sources for parts like those bearings. ☐

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100
YEARS OF
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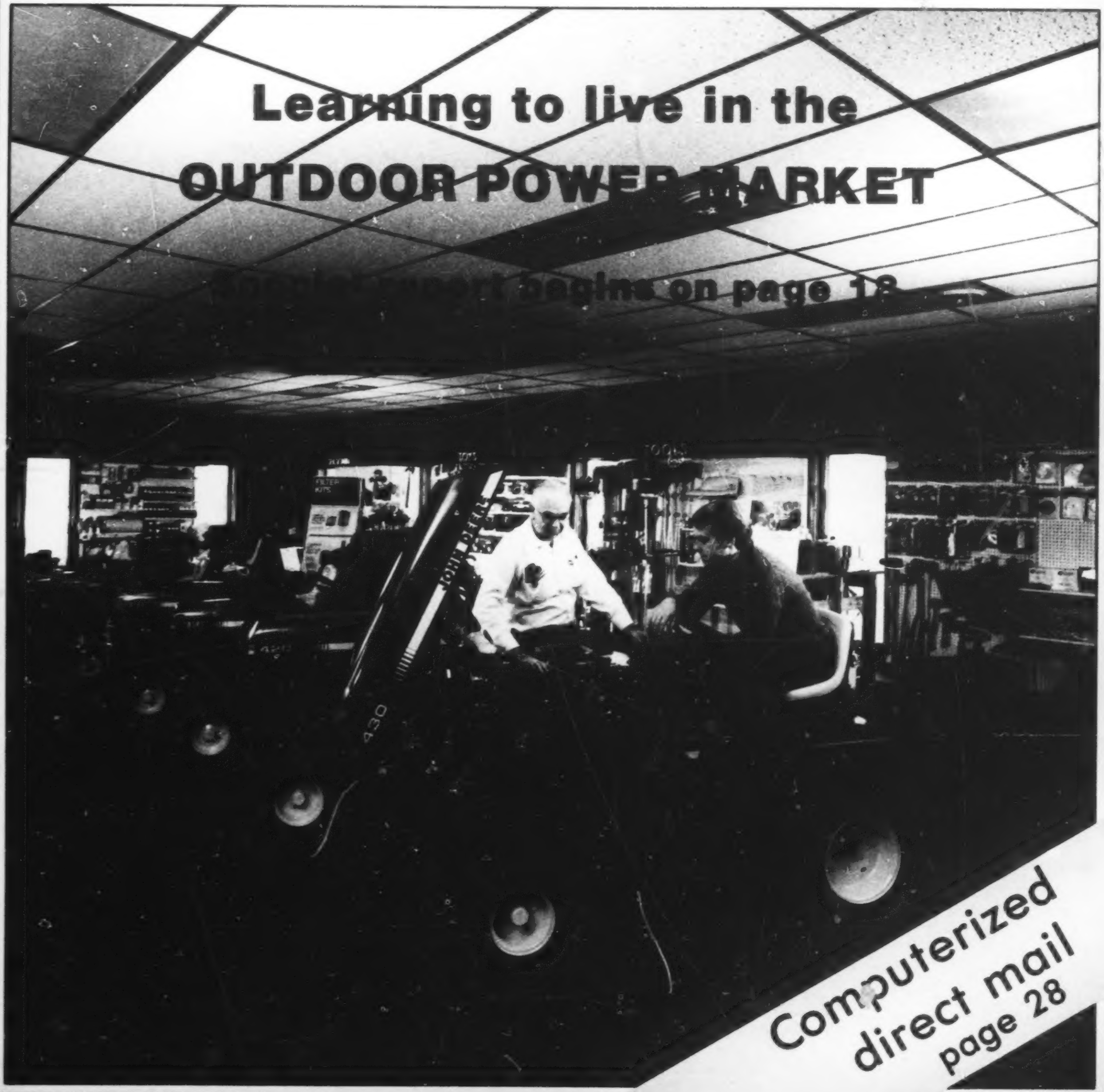
The business magazine of the farm and industrial equipment industry MARCH 1987

New ideas from Britain page 12



Learning to live in the OUTDOOR POWER MARKET

Special report begins on page 18

JOHN DEERE
430
FILTER KITS
TOOLS

Computerized direct mail page 28

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

March 1987 • Vol. 102 • No. 3

Our cover story

As their agricultural bases have receded in recent years, some dealers have discovered that successful businesses can continue with hobby farmers, suburban home owners, contractors, and landscape and golf course managers as customers. I&T takes a look at the growing outdoor power market. (Cover photo courtesy of Deere & Co.)

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Features

10: **Outdoor power equipment manufacturers** are putting more time and money into improving existing lines and developing new ones.

12: **British shows** have included new ideas for that country's farm equipment industry which found itself caught between a decline in tractor sales and an increase in competition in 1986.

16: **Tractor rentals** have become a profitable part of this dealership in the peach-growing region of South Carolina.

24: **Two dealers** tell how they made the transition to selling in the outdoor power market.

28: **A direct mail** promotional program is one of several innovative ideas which have generated sales for one dealership in the San Joaquin Valley.

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INDUSTRY UPDATE

Ford NH, Versatile agree to sale

Ford New Holland Inc. and Versatile Corp. have an agreement whereby Ford New Holland will acquire the Versatile Farm Equipment Co., subsidiary of Versatile Corp., subject to clearances by the U.S. and Canadian governments and final agreements on terms according to a Ford New Holland spokesman.

Price of Versatile will be $180 million (Canadian), including wholesale and retail receivables and the assumption by Ford New Holland of certain liabilities.

In addition, the Canadian government is providing a loan of $45.5 million (Canadian) to help relaunch the Versatile operation in Winnipeg which had been closed since July 1986.

The Ford New Holland spokesman said that it is hoped the Versatile facility will be opened in July.

The Versatile Farm Equipment Co. will report to New Holland Inc., subsidiary of Ford New Holland.

The spokesman said no Versatile management changes are anticipated. Paul M. Soubry is president and chief executive officer of Versatile Farm Equipment.

Lawn-garden inventories up after '86 season

The Outdoor Power Equipment Institute has reported the results of its November, 1986, survey showing levels of inventory of outdoor power equipment left at the end of the 1986 selling season.

Product Category	Units (000's)	Pct. Carryover Increase, 1986 vs. 1985
Walk-behind mowers	220.0	24
Front-engine tractors	12.1	9
Rear-engine riders	30.5	30
Garden tractors	42.4	35
Tillers	12.8	12

OPEI said there was a overall 23 percent increase in inventory levels for the 1986 season compared with 1985.

Hesston reports loss in '86

Hesston Corp. has reported a loss of $42.9 million in 1986 on sales of $120.3 million, compared with a 1985 loss of $18.8 million on sales of $168.2 million. Sales volume in the fourth quarter of 1986 was $31.5 million and the net loss was $11.7 million.

In 1985's fourth quarter, sales were $38.4 million and the loss was $8.8 million.

Mario Chessa, president and chief executive officer, said that dealer inventories of Hesston products are still too high and that factory shipments in 1987, as in 1986, would be reduced. This, he said, will have an adverse impact on 1987 earnings, as it did in 1986.

Farmhand funds study project

A "white paper" to develop a management perspective of available ideas and concepts to increase industrial uses of agricultural products will result from a Farmhand, Inc., grant to the Farm and Industrial Equipment Institute.

LITERATURE

Kuker Industries' new 1987 Kuker Line sprayer catalog offers a full line of sprayer parts and sprayer equipment. Dealers may send for a free copy.

Write in (7) on Reply Card

GT Inc., manufacturer of specialized farm equipment, grain dryers and conservation tillage drills, has produced a no-till factbook for free distribution to farmers interested in conservation farming. The new factbook has a basic introduction to conservation farming and covers the benefits and limitation of no-till farming, terminology, cropping considerations, weed control, and fertilization. GT manufactures no-till drills in widths of eight feet, 10 feet and 14 feet for a variety of crop applications.

Write in (8) on Reply Card

Hub City Division, Safeguard Power Transmission Co., describes the company's line of gear drives and reducers, motors, bearings, hydraulic pump drive lines and other products in "Hub City Power Transmission Products."

Write in (9) on Reply Card

OMC Lincoln describes its line of Cushman Front Line mowers in a new catalog. Accessories such as grass catchers, mower attachments and the 21-hp engine-powered units are included.

Write in (10) on Reply Card

J I Case Co. presents its Case IH model 1394 tractors in a brochure titled "Model 1394 General Purpose Tractor."

Write in (11) on Reply Card

Briefly...

Owatonna Mfg. Co., Owatonna, Minn., discontinued business as of December 11, 1986, after 121 years of operation. The company employed about 200 persons at the time of the shutdown. Long a manufacturer of hay tools, Owatonna had sold most of its agricultural lines to Gehl Co. earlier in 1986 and was continuing to make its line of Mustang skid-steer loaders and forklifts. The company was said to be unable to arrange extensions of financial agreements with banks in Minneapolis and St. Paul, Minn.

DaKon, Inc., farm equipment wholesaler based at Sioux Falls, S.D., discontinued operations December 1. It had marketed to dealers in seven upper midwestern states. John Hughes, who had been executive vice-president of DaKon, has formed Hughes Equipment Co. to market the Snapper line of outdoor power equipment in Nebraska, South Dakota and part of North Dakota.

KHD Cologne, West Germany, parent company of Deutz-Allis Corp., and Daimler-Benz, Stuttgart, W. Germany, have reached an agreement whereby a joint venture will develop a family of four-wheel drive tractors from 70 to 200 hp. KHD will own 60 percent of the venture. The agreement is subject to German government approval.

Tye Co., Lockney, Texas, will manufacture and market products using Paraplow legs in the United States, according to an arrangement with Thrige Agro of Skive, Denmark. Tye takes over from Howard Rotavator Co., Muscoda, Wis. Thrige Agro bought the Paraplow from Howard Machinery U.K. in 1985. Brian Inveraraity, who was Howard's Paraplow product manager, has joined Tye.

Kenneth F. Thompson, former president of **Sperry New Holland** and a retired Sperry Rand executive, died January 12 at Gastonia, N.C. He joined New Holland in 1953 and was named president in 1971.

How the lawn and garden market is growing

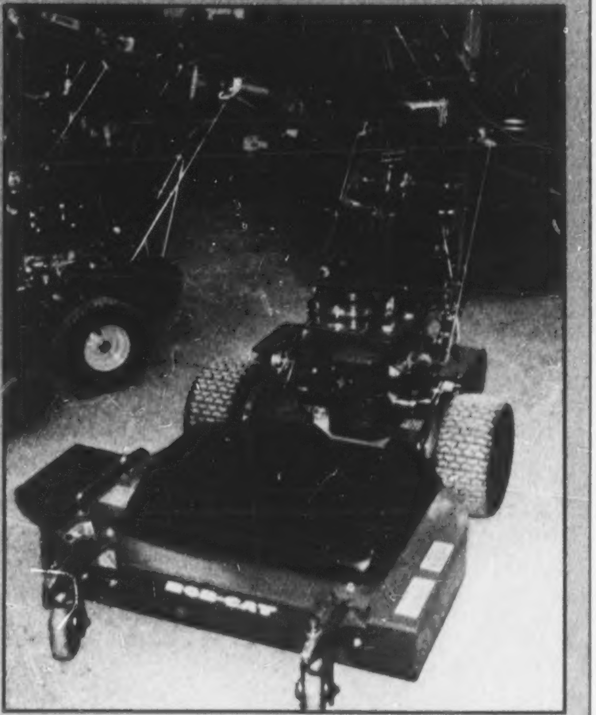
LAWN AND GARDEN EQUIPMENT — QUANTITY OF MANUFACTURERS' SHIPMENTS, 1983-1985

(in units)

SELECTED COMMERCIAL TURF AND GROUNDS MOWING AND CARE EQUIPMENT	**1985**	**1984**	**1983**
Powered non-riding mowers	58,455	69,304	38,744
Riding reel-type turf mowers and greens mowers	15,662	7,500	7,136
Riding rotary turf mowers	33,105	30,235	17,497
Gang rotary cutting units, reel and rotary, individual sections	14,290	14,503	15,16[illegible]
Flail mower cutting units, including gang	4,578	3,965	4,552
Other mowing equipment	4,703	4,660	5,645
Dethatchers	3,372	3,982	2,435
Power brooms, blower vacuums, sweepers	5,742	8,608	6,626
SELECTED CONSUMER RIDING LAWN AND GARDEN EQUIPMENT			
Lawn tractors and riding mowers			
Front engine, under 10 HP	119,007	86,165	104,825
Front engine, 10 HP and over	454,734	413,937	289,222
Rear engine, under 8 HP	28,675	35,795	40,223
Rear engine, 8-9.9 HP	188,811	130,936	151,473
Rear engine, 10 HP and over	130,936	134,680	85,933
Garden tractors			
Under 14 HP	31,862	21,620	19,938
14-15.9 HP	11,261	7,937	11,520
16 HP and over			
Other consumer riding lawn, garden and snow equipment	69,023	77,390	65,087
SELECTED CONSUMER NON-RIDING LAWN, GARDEN AND SNOW EQUIPMENT			
Lawn mowers			
Push type, gas powered, reel	34,844	32,066	27,293
Push type, gas powered, rotary	3,567,467	3,452,606	3,028,108
Self-propelled, gas powered, rotary and electric types	1,671,101	1,799,902	1,460,154
Rotary garden motor tillers and 2-wheel walking type tractors	352,810	434,366	403,939
Snowthrowers, single stage	282,386	272,398	129,611
Snowthrowers, dual stage	156,669	140,315	76,677
Shredders and shredder-grinders	55,770	34,229	26,616
Yard vacuums, blowers, lawn sweepers (except attachment type)	1,125,579	766,522	717,678

Source: *Current Industrial Reports, Series MA-35A, Bureau of the Census*

Comment: Here's documentation of movement in the lawn and garden industry. Some product areas were omitted by I&T because they were combined with other products to the extent that their unit shipment numbers had little relevance. One exception was garden tractors of 16 horsepower and over combined with other consumer riding equipment. That remained because of the significant quantities of larger garden tractors involved.



VALUE OF MANUFACTURERS' SHIPMENTS OF LAWN AND GARDEN EQUIPMENT

(in thousands of dollars)

Product Group	**1985**	**1984**	**1983**
Commercial turf and grounds mowing equipment	$316,102	$280,891	$227,531
Other commercial turf and grounds care equip.	59,148	52,872	35,641
Consumer non-riding lawn garden and snow equip.	1,529,044	1,450,452	1,222,559
Consumer riding lawn, garden and snow equip.	1,128,858	1,049,044	840,373

Source: *Current Industrial Reports, Series MA-35A, Bureau of the Census*

Comment: Manufacturers of lawn and garden equipment have been moving up in recent years, as this information from the Bureau of the Census indicates. Consumer products account for most of the industry's dollar volume, but commercial lines are showing the fastest rate of growth. From 1983 to 1985, value of consumer product shipments rose by $593 million or 29 percent. Commercial lawn and garden product shipments went up by $112 million or 43 percent.

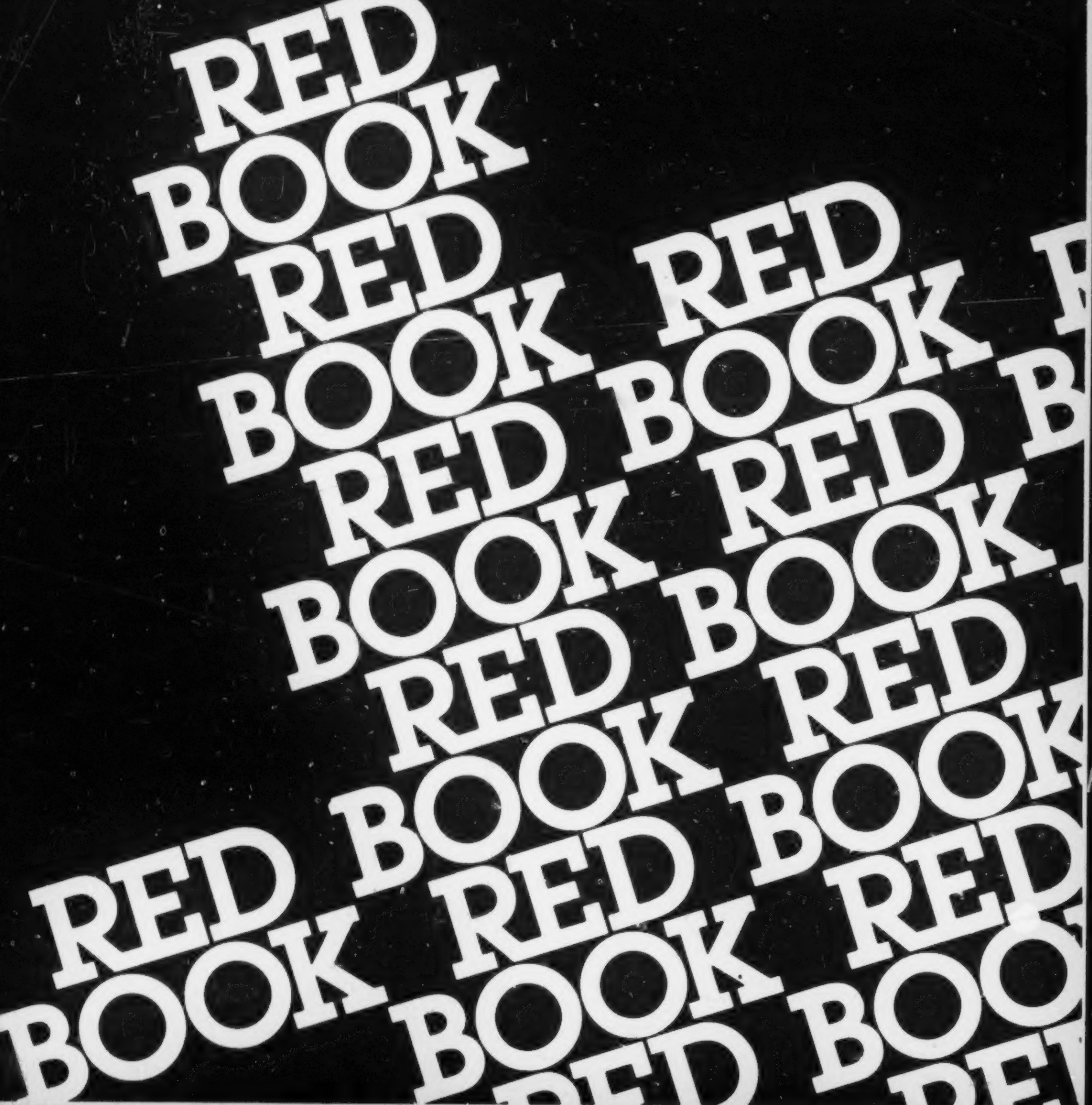
Elsewhere in this issue of I&T, a survey by the Outdoor Power Equipment Institute indicates that at the end of the 1986 selling season, carryover inventory of lawn and garden equipment was up 23 percent (in terms of units) from a year earlier.

It is believed that some of the increases in shipments and inventory are attributable to the availability of more farm equipment dealerships as active outlets for lawn and garden equipment.

Implement & Tractor

The business magazine of the farm and industrial equipment industry

March 31, 1987



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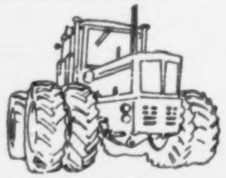

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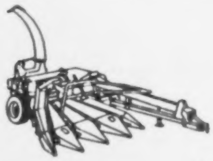

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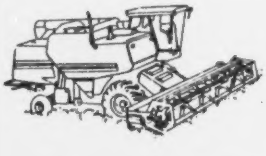

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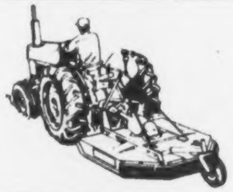

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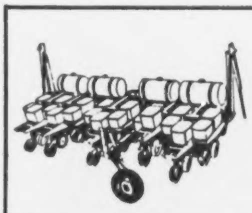

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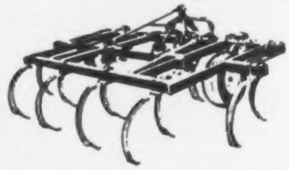

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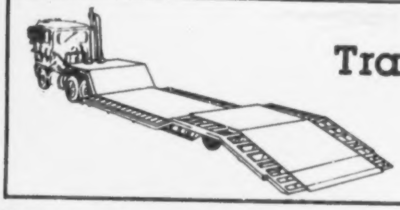

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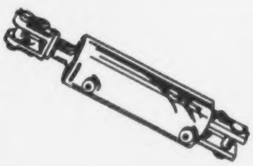

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Abbreviations:
DNA—Does not apply.
NA—Not available.
Std.—Standard.
Opt.—Optional
Linear measurements may be to nearest ¼-inch.

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The Nebraska Tractor Test Law

Purpose of the Law — The Nebraska Tractor Test Law originated in 1919 for the purpose of verifying advertising claims on tractors offered for sale to Nebraska farmers.

Its position as the only independent test laboratory in the United States devoted to the evaluation of tractor performance proved of unique value to the industry. The Agricultural Tractor Test Code used in the Nebraska Tests was developed with the approval and assistance of the American Society of Agricultural Engineers and the Society of Automotive engineers, and is revised and updated periodically as the need arises. The Test Code (ASAE S209.4 or SAE J708c) is published in the ASAE Yearbook and SAE Handbook.

Provisions of the Law — Stated briefly, the Nebraska Tractor Test Law, as amended in 1986, provides:

That a stock unit of each agricultural tractor model sold in Nebraska shall be tested and passed upon by a board of three engineers under the supervision and direction of the University of Nebraska, or by the O.E.C.D. Each tractor must be certified as a stock model and will be equipped with the common power consuming accessories. An official representative of the manufacturer is present during the test to see that the performance meets company standards.

The Department of Agriculture shall deny to any manufacturer the right to do business in the State on complaint of two or more bona fide customers that the company has failed to maintain an adequate service station with a full supply of replacement parts within the State and within reasonable distance of customers.

The law further states that it shall be unlawful to publish excerpts from any official test in advertising material without publishing the entire report.

The provisions of the Nebraska Test Law do not apply to any tractor the engine of which develops less than 20 horsepower; or to tractors manufactured, sold and used for heavy construction when identical units are not sold and used for agricultural purposes.

Explanation of Test Reports

General

Tractors are tested at the University of Nebraska according to the Agricultural Tractor Test Code approved by the American Society of Agricultural Engineers and the Society of Automotive Engineers or official Nebraska test procedure.

The manufacturer selects the tractor to be tested and certifies that it is a stock model. Each tractor is equipped with the common power consuming accessories such as power steering, power lift pump, generator, etc., if available. Power consuming accessories may be disconnected only when the means for disconnecting can be reached from the operating station. An official representative of the company is present during the test to see that the tractor gives its optimum performance. Additional weight may be added to the tractor as ballast if the manufacturer recommends use of such ballast. The static tire loads and the tire inflation pressures must conform to the specifications of Tire and Rim Association.

Preparation for Test

The engine crankcase is drained and refilled with new oil conforming to specifications in the operator's manual. The operator's manual is also used as the guide for selecting the proper fuel and for routine lubrication and maintenance operations.

The tractor is limbered up for a minimum of three hours on the drawbar. Preliminary adjustment of the tractor is permitted at this time. Any parts added or replaced during the limber-up run, or any subsequent runs, are mentioned in the individual test reports. The tractor is equipped with approximately the amount of added ballast that is to be used during the drawbar runs.

PTO Performance

Power take-off performance runs are made by connecting the power take-off to a dynamometer. During a preliminary power take-off run the manufacturer's representative may make adjustment for the fuel, ignition or injection timing and governor control settings. These settings must be maintained for the remainder of the test. The manually operated governor control mechanism is set to provide the high-idle speed specified by the manufacturer. During the power take-off runs an ambient air temperature of approximately 75°F. (24.0°C) is maintained.

Maximum power is obtained at the rated engine speed specified by the manufacturer with the governor control lever set for maximum power. This same setting is used for all subsequent PTO runs. Time of the run is two hours. Whenever the power take-off speed during the maximum power run differs from the speeds set forth in the ASAE and SAE standards, an additional run is made at either 540 or 1000 rpm of the power take-off shaft. Time of this run is one hour.

Drawbar Performance

Maximum drawbar power is shown for the normal field speed selected by the manufacturer. All engine adjustments are the same as those used in the power take-off runs. If the manufacturer specifies a different rated engine speed for drawbar operations, then the position of the manually operated governor control is changed to provide the high-idle speed specified.

Maximum drawbar power is determined within the following limits: (1) slip of the drivers must not exceed 15% for pneumatic tires on the concrete test course or 7% for steel cleats on the well packed earthen test course, (2) ground speeds must not exceed 10 miles per hour, (3) safe stability limits of the tractor must not be exceeded, (4) no other operating limit of the tractor must be exceeded. Drawbar load is applied until the manufacturer's rated engine speed is obtained with maximum governor control lever setting. Travel speed, drawbar pull and other data are recorded over two 500-foot straight level areas.

Fuel consumption is determined at the manufacturer's selected travel speed with the drawbar pull set: (1) to give rated engine rpm, (2) 75% of the pull at rated engine rpm, (3) 50% of the pull at rated engine rpm, and (4) maintaining the same load and travel speed as in (3) by shifting to a higher gear and reducing the engine rpm.

This summary shows the drawbar horsepower, corresponding travel speed and fuel consumption at 100%, 75% or 50% loads, and 50% of pull at reduced engine speed.

Also shown is the maximum drawbar horsepower produced for two 500-foot travel sections and corresponding travel speed, the maximum drawbar pull and the corresponding drive-wheel slippage.

In addition, the "lugging ability" obtained by increasing the load so that the full throttle engine speed drops to 80% of rated is given as a percent increase with respect to the pull at rated engine rpm.

The maximum drawbar horsepower and the corresponding speed and drawbar pull for other selected gears or travel speeds are shown in the individual test reports.

Three-point Hitch Test

The hitch testing procedure is based primarily on standard procedures (ASAE 349.1 and SAE J283) adopted by ASAE and the Society of Automotive Engineers, plus ASAE and SAE standards for tractor 3-point hitch and quick coupler dimensions and operation. ISO (International Standards Organization) standard 7414-1982 (E), "Agricultural Equipment—Matching of Wheeled Tractors and Rear Mounted Implements—Code Numbering System," has also had a role in the test development.

According to the procedure adopted by the Board of Test Engineers July 29, 1983, "The Three Point Hydraulic Lift test will apply to all tractors brought for testing to the Nebraska Tractor Test Laboratory which have the three-point lift attachment as standard equipment or as an option." Those procedures also specify that distribution and total tractor weight will be in accordance with limits set by the tractor manufacturer, tire manufacturer and ROPS certification, and weight shall include full fuel tanks and a 175-lb. operator. Front end ballast can only be provided by a standard weight package and/or front tire ballast supplied or recommended by the manufacturer.

The tractor is tested on the same rear tires used during drawbar track tests, and front tires of 2WD or FWA tractors may be of any size or ply offered by the tractor manufacturer as long as they properly match rear tires. A quick attaching coupler is used on all Category III and IV hitches and on any other tractors on which it is offered as standard equipment. But, the quick coupler is *not* considered part of the load lifted by the hitch.

Measurements taken include engine temperature, crankshaft rpm, hydraulic oil pressure and temperature, vertical displacement of lower link implement attaching points, lift time, vertical movement of the applied load, plus any other variables necessary to describe system performance.

Sound Measurement

Sound is recorded during each of the Drawbar Performance runs as the tractor travels on a straight section of the test course. The dB(A) sound level is obtained with the microphone located near the right ear of the operator. Bystander sound readings are taken with the microphone placed 25 feet (7.5 m) from the line of travel of the tractor. An increase of 10dB(A) will approximately double the loudness to the human ear.

Individual copies of any test report, annual summary booklets or annual subscription (at $7.00 for U.S.& Canada, $10.00 for foreign) are available. For complete information write to **Nebraska Tractor Test Laboratory, Department of Agricultural Engineering, The University of Nebraska—Lincoln, Institute of Agriculture and Natural Resources, Lincoln, NE 68583-0832.**

NEBRASKA TRACTOR TEST 1589—JOHN DEERE 3150 DIESEL 16 SPEED

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temperature °F (°C) Cooling medium	Temperature °F (°C) Air wet bulb	Temperature °F (°C) Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed — Two hours (PTO Speed — 997 rpm)									
	96.06 *(71.63)*	2400	5.841 *(22.111)*	0.426 *(0.259)*	16.45 *(3.240)*	183 *(84.1)*	64 *(17.6)*	75 *(23.8)*	28.90 *(97.59)*
VARYING POWER AND FUEL CONSUMPTION — Two Hours									
	83.90 *(62.56)*	2466	5.257 *(19.899)*	0.439 *(0.267)*	15.96 *(3.144)*	182 *(83.3)*	64 *(17.8)*	75 *(23.9)*	....
	0.00 *(0.00)*	2562	1.948 *(7.373)*	....	....	180 *(82.2)*	63 *(17.2)*	75 *(23.9)*	....
	42.58 *(31.75)*	2501	3.467 *(13.126)*	0.571 *(0.347)*	12.28 *(2.419)*	181 *(82.8)*	64 *(17.5)*	76 *(24.2)*	....
	96.53 *(71.98)*	2400	5.826 *(22.055)*	0.423 *(0.257)*	16.57 *(3.264)*	184 *(84.4)*	64 *(17.5)*	75 *(23.9)*	....
	21.43 *(15.98)*	2520	2.723 *(10.306)*	0.890 *(0.542)*	7.87 *(1.550)*	180 *(82.2)*	63 *(16.9)*	76 *(24.2)*	....
	63.39 *(47.27)*	2484	4.294 *(16.253)*	0.475 *(0.289)*	14.76 *(2.908)*	182 *(83.3)*	62 *(16.7)*	76 *(24.2)*	....
Av **Av**	**51.30** ***(38.26)***	**2489**	**3.919** ***(14.835)***	**0.535** ***(0.326)***	**13.09** ***(2.579)***	**182** ***(83.1)***	**63** ***(17.3)***	**75** ***(24.0)***	**28.90** ***(97.58)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	Fuel Consumption lb/hp.hr *(kg/kW.h)*	Fuel Consumption Hp.hr/gal *(kW.h/l)*	Temp °F (°C) Cooling med	Temp °F (°C) Air wet bulb	Temp °F (°C) Air dry bulb	Barom inch Hg *(kPa)*
Maximum Available Power — Two Hours 9th (5L) Gear											
81.92 *(61.09)*	5445 *(24.22)*	5.64 *(9.08)*	2399	5.08	5.758 *(21.795)*	0.493 *(0.300)*	14.23 *(2.803)*	185 *(84.7)*	47 *(8.3)*	60 *(15.6)*	29.18 *(98.54)*
75% of Pull at Maximum Power — Ten Hours 9th (5L) Gear											
65.18 *(48.60)*	4140 *(18.42)*	5.90 *(9.50)*	2473	3.63	4.887 *(18.500)*	0.525 *(0.320)*	13.34 *(2.627)*	184 *(84.3)*	46 *(7.7)*	58 *(14.3)*	29.13 *(98.36)*
50% of Pull at Maximum Power — Two Hours 9th (5L) Gear											
44.30 *(33.03)*	2760 *(12.28)*	6.02 *(9.69)*	2491	2.59	3.953 *(14.962)*	0.625 *(0.380)*	11.21 *(2.208)*	184 *(84.4)*	47 *(8.3)*	62 *(16.7)*	29.14 *(98.40)*
50% of Pull at Reduced Engine Speed — Two Hours 12th (6H) Gear											
44.30 *(33.03)*	2760 *(12.28)*	6.02 *(9.69)*	1469	2.63	3.025 *(11.451)*	0.479 *(0.291)*	14.64 *(2.883)*	182 *(83.1)*	49 *(9.4)*	62 *(16.7)*	28.96 *(97.78)*
MAXIMUM POWER IN SELECTED GEARS											
71.78 *(53.53)*	10507 *(46.74)*	2.56 *(4.12)*	2453	14.83	4th (2H) Gear			183 *(83.6)*	45 *(6.9)*	51 *(10.6)*	28.97 *(97.83)*
77.80 *(58.02)*	9565 *(42.55)*	3.05 *(4.91)*	2401	11.63	5th (3L) Gear			183 *(83.9)*	45 *(7.2)*	55 *(12.8)*	29.19 *(98.57)*
79.31 *(59.14)*	7645 *(34.00)*	3.89 *(6.26)*	2399	8.05	6th (3H) Gear			184 *(84.2)*	45 *(7.2)*	55 *(12.8)*	29.19 *(98.57)*
81.49 *(60.77)*	7062 *(31.41)*	4.33 *(6.96)*	2400	6.77	7th (4L) Gear			183 *(83.9)*	45 *(7.2)*	54 *(12.2)*	29.19 *(98.57)*
81.37 *(60.68)*	5647 *(25.12)*	5.40 *(8.70)*	2398	5.16	8th (4H) Gear			183 *(83.9)*	45 *(7.2)*	54 *(12.2)*	29.19 *(98.57)*
83.04 *(61.92)*	5520 *(24.55)*	5.64 *(9.08)*	2399	4.92	9th (5L) Gear			184 *(84.2)*	46 *(7.8)*	57 *(13.9)*	29.20 *(98.60)*
82.08 *(61.21)*	4395 *(19.55)*	7.00 *(11.27)*	2397	3.97	10th (5H) Gear			184 *(84.2)*	46 *(7.8)*	57 *(13.9)*	29.20 *(98.60)*
81.74 *(60.96)*	3863 *(17.18)*	7.94 *(12.77)*	2401	3.41	11th (6L) Gear			184 *(84.2)*	46 *(7.8)*	56 *(13.3)*	29.20 *(98.60)*
78.60 *(58.62)*	3004 *(13.36)*	9.81 *(15.79)*	2399	2.76	12th (6H) Gear			183 *(83.9)*	46 *(7.8)*	56 *(13.3)*	29.20 *(98.60)*

Department of Agricultural Engineering

Dates of Test: April 1 to 14, 1986

Manufacturer: JOHN DEERE TRACTOR WERKE MANNHEIM, Mannheim, West Germany

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 46.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F** *(15/15°C)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 15W-40 **API service classification** CD, CC, SD **To motor** 2.813 gal *(10.647 l)* **Drained from motor** 2.391 gal *(9.050 l)* **Transmission and final drive lubricant** John Deere Hy-Gard transmission and hydraulic oil **Total time engine was operated** 35.0 hours.

ENGINE: Make John Deere Diesel **Type** six cylinder vertical **Serial No.** *CD6359D683229* **Crankshaft** lengthwise **Rated rpm** 2400 **Bore and stroke** 4.19" × 4.33" *(106.5 mm × 110 mm)* **Compression ratio** 17.8 to 1 **Displacement** 359 cu in *(5883 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper cartridge **Muffler** underhood **Exhaust** vertical **Cooling medium temperature control** two thermostats.

CHASSIS: Type front wheel assist **Serial No.** *L03150U565096* **Tread width** rear 62.2" *(1580 mm)* to 94.9" *(2410 mm)* front 66.9" *(1700 mm)* to 82.7" *(2100 mm)* **Wheel base** 101.7" *(2582 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 36.1" *(917 mm)* Vertical distance above roadway 38.6" *(980 mm)* Horizontal distance from center of rear wheel tread 0.2" *(5 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.7 *(2.7)* second 2.1 *(3.3)* third 2.3 *(3.8)* fourth 2.9 *(4.6)* fifth 3.4 *(5.4)* sixth 4.1 *(6.6)* seventh 4.5 *(7.3)* eighth 5.5 *(8.9)* ninth 5.8 *(9.3)* tenth 7.1 *(11.4)* eleventh 8.0 *(12.9)* twelfth 9.8 *(15.8)* thirteenth 11.5 *(18.5)* fourteenth 14.1 *(22.7)* fifteenth 15.5 *(24.9)* sixteenth 19.0 *(30.6)* reverse 2.6 *(4.2)*, 3.2 *(5.1)*, 3.6 *(5.8)*, 4.4 *(7.1)*, 5.1 *(8.3)*, 6.3 *(10.2)*, 6.9 *(11.2)*, 8.5 *(13.7)* **Clutch** single dry disc hydraulically actuated by foot pedal **Brakes** wet disc hydraulically power actuated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 162" *(4.11 m)* left 162" *(4.11 m)* (on concrete surface without brake) right 169" *(4.30 m)* left 169" *(4.30 m)* **Turning space diameter** (on concrete surface with brake applied) right 341" *(8.66 m)* left 341" *(8.66 m)* (on concrete surface without brake) right 355" *(9.01 m)* left 355" *(9.01 m)* **Power take-off** 540 rpm at 2415 engine rpm and 997 rpm at 2400 engine rpm **Unladen tractor mass** 11770 lb *(5339 kg)*.

LUGGING ABILITY IN 9th (5L) GEAR

Crankshaft Speed rpm	2399	2160	1921	1687	1432	1206	958
Pull—lbs *(kN)*	5520 *(24.55)*	6187 *(27.52)*	6610 *(29.40)*	7076 *(31.48)*	7271 *(32.34)*	7383 *(32.84)*	7263 *(32.31)*
Increase in Pull %	0	12	20	28	32	34	32
Power—Hp *(kW)*	83.04 *(61.92)*	83.16 *(62.01)*	78.53 *(58.56)*	73.34 *(54.69)*	63.76 *(47.55)*	54.37 *(40.54)*	42.51 *(31.70)*
Speed—Mph *(km/h)*	5.64 *(9.08)*	5.04 *(8.11)*	4.46 *(7.17)*	3.89 *(6.25)*	3.29 *(5.29)*	2.76 *(4.44)*	2.19 *(3.53)*
Slip %	4.92	5.83	6.47	6.92	7.37	7.52	7.32

TRACTOR SOUND LEVEL WITH CAB	Front Wheel Drive Disengaged dB(A)	Front Wheel Drive Engaged dB(A)
Maximum Available Power—Two Hours		77.0
75% of Pull at Maximum Power—Ten Hours		77.5
50% of Pull at Maximum Power—Two Hours		76.5
50% of Pull at Reduced Engine Speed—Two Hours		72.0
Bystander in 16th (8H) gear	90.0	

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Two 18.4-38, 8, 16 *(110)*	Two 18.4-38, 8, 16 *(110)*
Ballast	—Liquid (each)	None	None
	—Test equip (each)	50 lb *(23 kg)*	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 16.9-24, 6, 16 *(110)*	Two 16.9-24, 6, 16 *(110)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	120 lb *(54 kg)*	None
Height of Drawbar		20 in *(510 mm)*	20 in *(510 mm)*
Static Weight with Operator	—Rear	7860 lb *(3565 kg)*	7745 lb *(3513 kg)*
	—Front	4440 lb *(2014 kg)*	4200 lb *(1905 kg)*
	—Total	12300 lb *(5579 kg)*	11945 lb *(5418 kg)*

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)*	2350	*(16200)*		
Location	pump			
Hydraulic oil temperature °F (°C)	152	*(67)*		
Location	pump inlet			
	Maximum Lift Capacity		**Lift Capacity for Transport**	
QUICK ATTACH	no		no	
CATEGORY	2		2	
Load lbs *(kg)*	6308	*(2861)*	4272	*(1938)*
TIME sec.	3.41		2.48	
HITCH POINT MOVEMENT in *(mm)*				
Lowest position	12.7	*(323)*	8.0	*(203)*
Top of timed range	36.7	*(932)*	31.6	*(803)*
Highest position	36.7	*(932)*	31.6	*(803)*
LOAD CG MOVEMENT in *(mm)*				
Lowest position	12.1	*(307)*	8.0	*(203)*
Top of timed range	40.9	*(1039)*	33.7	*(856)*
Highest position	41.0	*(1041)*	33.7	*(856)*

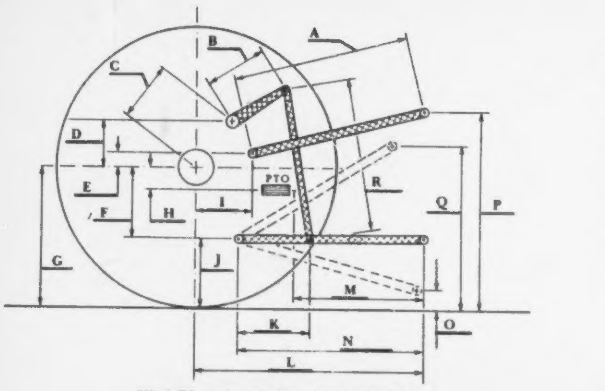
REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 141°F *(60.7°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1589**, May 6, 1986.

LOUIS I. LEVITICUS
Engineer-in-Charge

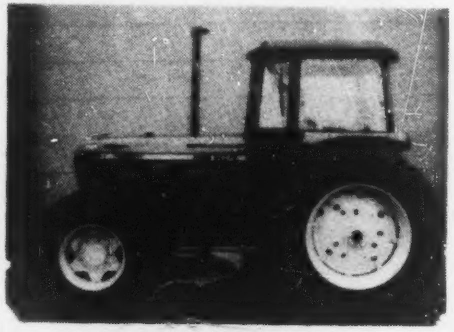
K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Hitch Dimensions as Tested — No Load

	inch	*mm*
A	24.1	*613*
B	12.4	*315*
*C	13.2	*336*
D	13.2	*336*
E	6.9	*176*
F	9.9	*251*
G	32.1	*816*
H	2.8	*71*
I	18.5	*470*
J	22.3	*565*
K	22.2	*565*
L	43.3	*1101*
M	22.0	*560*
N	38.8	*986*
O	8.0	*203*
P	41.3	*1048*
Q	33.8	*857*
R	29.5	*749*

* rockshaft is ahead of rear axle.



John Deere 3150 Diesel

NEBRASKA TRACTOR TEST 1590—JOHN DEERE 4050 QUADRANGE DIESEL 16 SPEED

CHASSIS SERIAL NUMBERS RW4050H006510 AND HIGHER

POWER TAKE-OFF PERFORMANCE

	Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION									
Rated Engine Speed — Two hours (PTO Speed — 1003 rpm)									
	105.89 *(78.96)*	2201	6.147 *(23.267)*	0.407 *(0.247)*	17.23 *(3.394)*	196 *(91.1)*	57 *(14.0)*	74 *(23.6)*	28.69 *(96.88)*
VARYING POWER AND FUEL CONSUMPTION — Two Hours									
	92.39 *(68.89)*	2258	5.621 *(21.277)*	0.426 *(0.259)*	16.44 *(3.238)*	192 *(88.9)*	59 *(14.7)*	79 *(25.8)*	.....
	0.00 *(0.00)*	2374	1.982 *(7.503)*	....	....	.. ...	56 *(13.3)*	74 *(23.1)*	.....
	47.38 *(35.33)*	2317	3.737 *(14.147)*	0.553 *(0.336)*	12.68 *(2.497)*	185 *(84.7)*	59 *(14.7)*	79 *(26.1)*	.....
	106.59 *(79.48)*	2200	6.113 *(23.140)*	0.402 *(0.244)*	17.44 *(3.435)*	196 *(90.8)*	62 *(16.7)*	76 *(24.2)*	.....
	24.00 *(17.90)*	2348	2.928 *(11.084)*	0.855 *(0.520)*	8.20 *(1.615)*	181 *(82.8)*	64 *(17.5)*	75 *(23.6)*	.....
	70.25 *(52.39)*	2292	4.662 *(17.647)*	0.465 *(0.283)*	15.07 *(2.969)*	187 *(85.8)*	63 *(17.2)*	76 *(24.2)*	.....
Av ***Av***	**56.77** ***(42.33)***	**2298**	**4.174** ***(15.800)***	**0.515** ***(0.313)***	**13.60** ***(2.679)***	**188** ***(86.6)***	**60** ***(15.7)***	**76** ***(24.5)***	**28.65** ***(96.76)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp. °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom inch Hg *(kPa)*
Maximum Available Power — Two Hours 7th (B2) Gear											
94.99 *(70.83)*	6085 *(27.07)*	5.85 *(9.42)*	2199	4.88	6.193 *(23.443)*	0.457 *(0.278)*	15.34 *(3.021)*	191 *(88.1)*	58 *(14.4)*	68 *(19.7)*	28.91 *(97.61)*
75% of Pull at Maximum Power — Ten Hours 7th (B2) Gear											
75.80 *(56.53)*	4617 *(20.54)*	6.16 *(9.91)*	2285	3.72	5.318 *(20.132)*	0.492 *(0.299)*	14.25 *(2.808)*	186 *(85.6)*	56 *(13.6)*	63 *(17.2)*	28.66 *(96.77)*
50% of Pull at Maximum Power — Two Hours 7th (B2) Gear											
51.85 *(38.67)*	3081 *(13.70)*	6.31 *(10.16)*	2313	2.47	4.274 *(16.178)*	0.578 *(0.351)*	12.13 *(2.390)*	185 *(85.0)*	58 *(14.4)*	72 *(21.9)*	28.91 *(97.61)*
50% of Pull at Reduced Engine Speed — Two Hours 12th (B4) Gear											
51.84 *(38.66)*	3081 *(13.70)*	6.31 *(10.16)*	1399	2.43	3.332 *(12.613)*	0.450 *(0.274)*	15.56 *(3.065)*	184 *(84.4)*	57 *(13.6)*	71 *(21.7)*	28.89 *(97.56)*
MAXIMUM POWER IN SELECTED GEARS											
71.75 *(53.51)*	11381 *(50.62)*	2.36 *(3.81)*	2277	14.62	2nd (A2) Gear			186 *(85.6)*	62 *(16.7)*	66 *(18.9)*	28.62 *(96.65)*
88.45 *(65.96)*	10816 *(48.11)*	3.07 *(4.94)*	2202	11.99	3rd (A3) Gear			188 *(86.7)*	62 *(16.7)*	66 *(18.9)*	28.63 *(96.68)*
93.20 *(69.50)*	8573 *(38.13)*	4.08 *(6.56)*	2202	7.84	4th (A4) Gear			191 *(88.3)*	62 *(16.7)*	66 *(18.9)*	28.64 *(96.71)*
94.17 *(70.22)*	7825 *(34.81)*	4.51 *(7.26)*	2201	6.89	5th (B1) Gear			191 *(88.1)*	63 *(17.2)*	65 *(18.3)*	28.68 *(96.85)*
94.14 *(70.20)*	6506 *(28.94)*	5.43 *(8.73)*	2200	5.53	6th (C1) Gear			190 *(87.8)*	62 *(16.7)*	66 *(18.9)*	28.68 *(96.85)*
96.35 *(71.85)*	6167 *(27.43)*	5.86 *(9.43)*	2201	4.92	7th (B2) Gear			192 *(88.6)*	57 *(13.9)*	69 *(20.6)*	28.91 *(97.61)*
96.03 *(71.61)*	5139 *(22.86)*	7.01 *(11.28)*	2202	4.06	8th (C2) Gear			187 *(86.1)*	56 *(13.3)*	61 *(16.1)*	28.86 *(97.46)*
94.99 *(70.84)*	4616 *(20.53)*	7.72 *(12.42)*	2199	3.67	9th (B3) Gear			187 *(86.1)*	57 *(13.9)*	63 *(17.2)*	28.88 *(97.52)*
93.40 *(69.65)*	4104 *(18.26)*	8.53 *(13.73)*	2199	3.27	10th (D1) Gear			188 *(86.7)*	58 *(14.4)*	64 *(17.8)*	28.89 *(97.56)*

Department of Agricultural Engineering

Dates of Test: April 1 to 9, 1986

Manufacturer: JOHN DEERE TRACTOR WORKS, P.O. Box 3500, Waterloo, Iowa 50704

FUEL, OIL AND TIME:Fuel No. 2 Diesel **Cetane No.** 46.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F** *(15/15°C)* 0.8117 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 15W-40 **API service classification** CD, CC, SD **To motor** 3.991 gal *(15.107 l)* **Drained from motor** 3.831 gal *(14.501 l)* **Transmission and final drive lubricant** John Deere Hy-gard transmission and hydraulic fluid **Total time engine was operated** 33.5 hours.

ENGINE: Make John Deere Diesel **Type** six cylinder vertical with turbocharger **Serial No.** *CD6359T681989* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.19" × 4.33" *(106.5 mm × 110 mm)* **Compression ratio** 17.8 to 1 **Displacement** 359 cu in *(5883 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** two thermostats and variable speed fan.

CHASSIS: Type standard with duals **Serial No.** *RW4050H006554* **Tread width** rear 60" *(1524 mm)* to 128.7" *(3269 mm)* front 58" *(1473 mm)* to 82" *(2083 mm)* **Wheel base** 106.7" *(2710 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.4" *(772 mm)* Vertical distance above roadway 45.0" *(1143 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with partial (2) range operator controlled powershift **Advertised speeds mph *(km/h)*** first 2.1 *(3.4)* second 2.7 *(4.3)* third 3.4 *(5.5)* fourth 4.4 *(7.0)* fifth 4.8 *(7.7)* sixth 5.7 *(9.1)* seventh 6.1 *(9.8)* eighth 7.2 *(11.6)* ninth 7.9 *(12.7)* tenth 8.7 *(14.0)* eleventh 9.4 *(15.1)* twelfth 10.1 *(16.2)* thirteenth 11.1 *(17.8)* fourteenth 11.9 *(19.2)* fifteenth 14.4 *(23.2)*, sixteenth 18.3 *(29.4)* reverse 3.3 *(5.4)*, 4.2 *(6.8)*, 7.7 *(12.3)*, 9.1 *(14.6)*, 9.7 *(15.7)*, 11.5 *(18.6)* **Clutch** multiple wet disc hydraulically power actuated by foot pedal **Brakes** wet disc hydraulically power actuated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 146" *(3.7 m)* left 146" *(3.7 m)*(on concrete surface without brake) right 157" *(4.0 m)* left 157"

Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska-Lincoln
Irvin T. Omtvedt, Dean and Director

LUGGING ABILITY IN 7th (B2) GEAR

Crankshaft Speed rpm	2201	1981	1751	1537	1328	1091
Pull—lbs *(kN)*	6167 *(27.43)*	6942 *(30.88)*	7820 *(34.79)*	8197 *(36.46)*	7925 *(35.24)*	7255 *(32.27)*
Increase in Pull %	0	13	27	33	28	18
Power—Hp *(kW)*	96.35 *(71.85)*	96.63 *(72.06)*	95.16 *(70.96)*	87.12 *(64.96)*	73.01 *(54.44)*	55.26 *(41.21)*
Speed—Mph *(km/h)*	5.86 *(9.43)*	5.22 *(8.40)*	4.56 *(7.34)*	3.99 *(6.41)*	3.46 *(5.56)*	2.86 *(4.60)*
Slip %	4.92	5.84	6.89	7.35	7.03	6.44

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	73.0
75% of Pull at Maximum Power—Ten Hours	73.5
50% of Pull at Maximum Power—Two Hours	74.5
50% of Pull at Reduced Engine Speed—Two Hours	71.0
Bystander in 16th (D4) gear	86.5

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 18.4-38, 6, 12 *(83)*	Four 18.4-38, 6, 12 *(83)*
Ballast	—Liquid (each tire)	577 lb *(262 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 11.00-16, 8, 40 *(275)*	Two 11.00-16, 8, 40 *(275)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	63 lb *(29 kg)*	None
Height of Drawbar		23 in *(585 mm)*	23 in *(585 mm)*
Static Weight with Operator	—Rear	10020 lb *(4545 kg)*	8865 lb *(4021 kg)*
	—Front	3650 lb *(1656 kg)*	3525 lb *(1599 kg)*
	—Total	13670 lb *(6201 kg)*	12390 lb *(5620 kg)*

(4.0 m) **Turning space diameter** (on concrete surface with brake applied) right 302" *(7.67 m)* left 302" *(7.67 m)*(on concrete surface without brake) right 338" *(8.58 m)* left 338" *(8.58 m)* **Power take-off** 540 rpm at 2201 engine rpm and 1003 rpm at 2201 engine rpm **Unladen tractor mass** 11105 lb *(5037 kg)*.

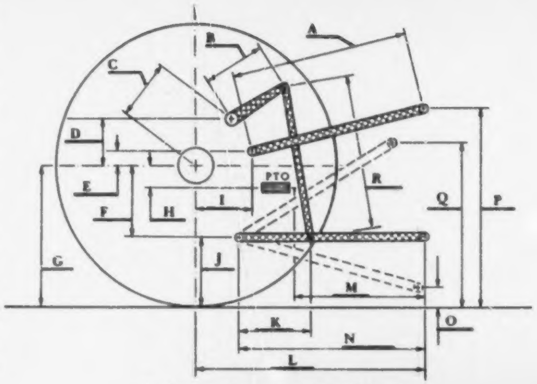
REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 150°F *(65.7°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to chassis serial numbers RW4050H006510 and higher.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1590**, May 6, 1986.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Hitch Dimensions as Tested — No Load

	inch	mm
A	28.1	*714*
B	11.5	*292*
*C	11.3	*287*
D	10.9	*278*
E	5.5	*140*
F	10.2	*259*
G	31.5	*799*
H	5.5	*140*
I	13.5	*343*
J	21.3	*540*
K	23.1	*587*
L	41.2	*1046*
M	21.5	*547*
N	36.7	*932*
O	8.0	*203*
P	40.3	*1022*
Q	35.3	*895*
R	33.0	*838*

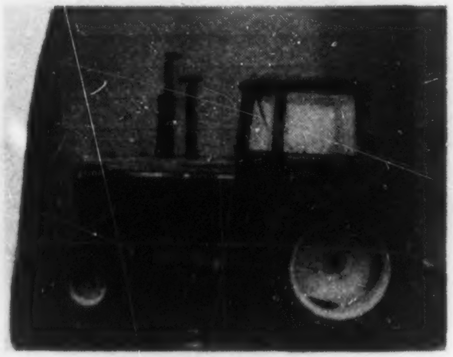
* rockshaft is ahead of rear axle.

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)*	2300	*(15860)*
Location	pressure control valve	
Hydraulic oil temperature °F *(°C)*	148	*(64)*
Location	pump inlet	

	Maximum Lift Capacity		Lift Capacity for Transport		Maximum Lift Capacity with optional boost cylinder	
QUICK ATTACH	no		no		no	
CATEGORY	2		2		2	
Load lbs *(kg)*	**5965	*(2706)*	4450	*(2018)*	***7230	*(3279)*
TIME sec	8.05		1.91		5.69	
HITCH POINT MOVEMENT in *(mm)*						
Lowest position	11.8	*(300)*	8.0	*(203)*	11.9	*(302)*
Top of timed range	35.8	*(909)*	32.3	*(820)*	35.9	*(912)*
Highest position	36.4	*(925)*	32.3	*(820)*	36.5	*(927)*
LOAD CG MOVEMENT in *(mm)*						
Lowest position	9.8	*(249)*	5.8	*(147)*	9.8	*(249)*
Top of timed range	38.7	*(983)*	34.2	*(869)*	38.8	*(986)*
Highest position	39.8	*(1011)*	34.2	*(869)*	39.6	*(1006)*

**The manufacturer's claimed capacity was 6294 lbs *(2855 kg)*
***The manufacturer's claimed capacity was 7418 lbs *(3365 kg)*



John Deere 4050 Quadrange Diesel

Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Irvin T. Omtvedt, Dean and Director

NEBRASKA TRACTOR TEST 1591—JOHN DEERE 4050 POWERSHIFT DIESEL 15 SPEED

CHASSIS SERIAL NUMBERS RW4050P006510 AND HIGHER

POWER TAKE-OFF PERFORMANCE

Power Hp *(kW)*	Crank shaft speed rpm	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg *(kPa)*
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed — Two hours (PTO Speed — 1003 rpm)								
105.69 *(78.81)*	2200	6.074 *(22.992)*	0.403 *(0.245)*	17.40 *(3.428)*	205 *(96.2)*	70 *(20.9)*	75 *(23.9)*	28.63 *(96.68)*
VARYING POWER AND FUEL CONSUMPTION — Two Hours								
92.13 *(68.70)*	2257	5.535 *(20.953)*	0.421 *(0.256)*	16.64 *(3.279)*	198 *(92.2)*	70 *(20.8)*	75 *(23.9)*	....
0.00 *(0.00)*	2367	1.969 *(7.454)*	....	....	179 *(81.7)*	69 *(20.6)*	75 *(21.6)*	....
47.30 *(35.27)*	2316	3.664 *(13.871)*	0.543 *(0.330)*	12.91 *(2.543)*	182 *(83.3)*	69 *(20.6)*	75 *(23.6)*	....
106.36 *(79.31)*	2201	6.032 *(22.832)*	0.397 *(0.242)*	17.63 *(3.474)*	198 *(92.2)*	70 *(21.1)*	75 *(23.9)*	....
23.90 *(17.82)*	2342	2.872 *(10.873)*	0.842 *(0.512)*	8.32 *(1.639)*	180 *(82.2)*	71 *(21.4)*	75 *(23.9)*	....
70.38 *(52.48)*	2289	4.598 *(17.404)*	0.458 *(0.278)*	15.31 *(3.015)*	186 *(85.5)*	71 *(21.7)*	76 *(24.2)*	....
Av 56.68 ***(42.26)***	**2295**	**4.112** ***(15.565)***	**0.508** ***(0.309)***	**13.78** ***(2.715)***	**187** ***(86.2)***	**70** ***(21.0)***	**75** ***(23.8)***	**28.65** ***(96.76)***

DRAWBAR PERFORMANCE

Power Hp *(kW)*	Drawbar pull lbs *(kN)*	Speed mph *(km/h)*	Crank-shaft speed rpm	Slip %	Fuel Consumption gal/hr *(l/h)*	lb/hp.hr *(kg/kW.h)*	Hp.hr/gal *(kW.h/l)*	Temp °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom inch Hg *(kPa)*
Maximum Available Power — Two Hours 10th Gear											
88.28 *(65.83)*	5195 *(23.11)*	6.37 *(10.26)*	2200	4.09	6.043 *(22.876)*	0.480 *(0.292)*	14.61 *(2.878)*	198 *(92.2)*	53 *(11.7)*	70 *(21.1)*	28.84 *(97.39)*
75% of Pull at Maximum Power — Ten Hours 10th Gear											
70.09 *(52.27)*	3946 *(17.55)*	6.66 *(10.72)*	2271	2.90	5.204 *(19.699)*	0.520 *(0.317)*	13.47 *(2.653)*	188 *(86.8)*	56 *(13.3)*	67 *(19.6)*	28.68 *(96.85)*
50% of Pull at Maximum Power — Two Hours 10th Gear											
47.83 *(35.67)*	2631 *(11.70)*	6.82 *(10.97)*	2307	2.13	4.352 *(16.475)*	0.638 *(0.388)*	10.99 *(2.165)*	182 *(83.3)*	33 *(0.5)*	36 *(1.9)*	29.03 *(98.03)*
50% of Pull at Reduced Engine Speed — Two Hours 13th Gear											
47.75 *(35.61)*	2632 *(11.71)*	6.80 *(10.95)*	1407	2.17	3.289 *(12.451)*	0.483 *(0.294)*	14.52 *(2.860)*	181 *(82.8)*	38 *(3.3)*	41 *(5.0)*	29.05 *(98.10)*

MAXIMUM POWER IN SELECTED GEARS

79.21 *(59.06)*	11378 *(50.61)*	2.61 *(4.20)*	2233	14.61	4th Gear			184 *(84.2)*	40 *(4.4)*	45 *(7.2)*	29.05 *(98.10)*
85.79 *(63.97)*	10342 *(46.00)*	3.11 *(5.01)*	2201	10.45	5th Gear			185 *(85.0)*	41 *(5.0)*	47 *(8.3)*	29.04 *(98.06)*
89.47 *(66.72)*	9423 *(41.92)*	3.56 *(5.73)*	2199	9.62	6th Gear			195 *(90.6)*	51 *(10.6)*	68 *(20.0)*	28.91 *(97.62)*
89.17 *(66.49)*	7968 *(35.44)*	4.20 *(6.75)*	2198	7.34	7th Gear			197 *(91.4)*	51 *(10.6)*	68 *(20.0)*	28.91 *(97.62)*
87.27 *(65.07)*	6843 *(30.44)*	4.78 *(7.70)*	2202	6.00	8th Gear			193 *(89.4)*	51 *(10.6)*	68 *(20.0)*	28.90 *(97.59)*
87.81 *(65.48)*	5921 *(26.34)*	5.56 *(8.95)*	2198	4.94	9th Gear			196 *(90.8)*	52 *(11.1)*	68 *(20.0)*	28.89 *(97.56)*
89.42 *(66.68)*	5261 *(23.40)*	6.37 *(10.26)*	2203	4.16	10th Gear			197 *(91.4)*	52 *(11.1)*	68 *(20.0)*	28.87 *(97.49)*
88.98 *(66.35)*	4523 *(20.12)*	7.38 *(11.87)*	2200	3.69	11th Gear			198 *(91.9)*	52 *(11.1)*	68 *(20.0)*	28.89 *(97.56)*
91.64 *(68.34)*	4040 *(17.97)*	8.51 *(13.69)*	2199	3.06	12th Gear			196 *(91.1)*	52 *(11.1)*	68 *(20.0)*	28.88 *(97.52)*

Department of Agricultural Engineering

Dates of Test: April 1 to 16, 1986

Manufacturer: JOHN DEERE TRACTOR WORKS, P.O. Box 3500, Waterloo, Iowa 50704

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 46.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F** *(15/15°C)* 0.8417 **Fuel weight** 7.008 lbs/gal *(0.840 kg/l)* **Oil SAE** 15W-40 **API service classification** CD, CC, SD **To motor** 4.022 gal *(15.224 l)* **Drained from motor** 3.845 gal *(14.554 l)* **Transmission and final drive lubricant** John Deere Hy-Gard transmission and hydraulic fluid **Total time engine was operated** 38.5 hours.

ENGINE: Make John Deere Diesel **Type** six cylinder vertical with turbocharger **Serial No.** *CD6359T681988* **Crankshaft** lengthwise **Rated rpm** 2200 **Bore and stroke** 4.19" × 4.33" *(106.5 mm × 110 mm)* **Compression ratio** 17.8 to 1 **Displacement** 359 cu in *(5883 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements **Oil filter** one full flow paper cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic and transmission oil **Fuel filter** one paper cartridge **Muffler** vertical **Cooling medium temperature control** two thermostats and variable speed fan

CHASSIS: Type standard with duals **Serial No.** *RW4050P006572* **Tread width** rear 60" *(1524 mm)* to 128.7" *(3269 mm)* front 58" *(1473 mm)* to 82" *(2083 mm)* **Wheel base** 106.7" *(2710 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 30.7" *(780 mm)* Vertical distance above roadway 45.0" *(1143 mm)* Horizontal distance from center of rear wheel tread 0.4" *(10 mm)* to the left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled powershift **Advertised speeds mph** *(km/h)* first 1.4 *(2.2)* second 2.0 *(3.2)* third 2.3 *(3.7)* fourth 3.0 *(4.8)* fifth 3.4 *(5.5)* sixth 3.9 *(6.3)* seventh 4.5 *(7.2)* eighth 5.0 *(8.1)* ninth 5.8 *(9.3)* tenth 6.6 *(10.6)* eleventh 7.6 *(12.2)* twelfth 8.7 *(14.0)* thirteenth 10.8 *(17.3)* fourteenth 14.7 *(23.7)* fifteenth 18.2 *(29.3)* reverse 1.7 *(2.7)*, 2.4 *(3.9)*, 3.6 *(5.9)*, 5.5 *(8.8)* **Clutch** wet multiple disc hydraulically power actuated by foot pedal **Brakes** wet disc hydraulically power actuated by two foot pedals which can be locked together **Steering** hydrostatic **Turning radius** (on concrete surface with brake applied) right 146" *(3.7 m)* left 146" *(3.7 m)*(on concrete surface without brake) right 157" *(4.0 m)* left 157" *(4.0 m)* **Turning space diameter** (on concrete surface with brake applied) right 302" *(7.67 m)* left 302" *(7.67 m)*(on concrete surface without brake) right 338" *(8.58 m)* left 338" *(8.58 m)* **Power take-off** 540 rpm at 2201 and 1003 rpm at 2200 engine rpm **Unladen tractor mass** 11400 lb *(5171 kg)*.

LUGGING ABILITY IN 10th GEAR

Crankshaft Speed rpm	2203	1976	1761	1549	1314	1103
Pull—lbs *(kN)*	5261 *(23.40)*	6131 *(27.27)*	6609 *(29.40)*	6949 *(30.91)*	7019 *(31.22)*	6612 *(29.41)*
Increase in Pull %	0	17	26	32	33	26
Power—Hp *(kW)*	89.42 *(66.68)*	92.65 *(69.09)*	88.53 *(66.02)*	81.48 *(60.76)*	69.76 *(52.02)*	55.38 *(41.30)*
Speed—Mph *(km/h)*	6.37 *(10.26)*	5.67 *(9.12)*	5.02 *(8.08)*	4.40 *(7.08)*	3.73 *(6.00)*	3.14 *(5.06)*
Slip %	4.16	5.09	5.40	6.00	6.15	5.70

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	74.5
75% of Pull at Maximum Power—Ten Hours	74.5
50% of Pull at Maximum Power—Two Hours	75.0
50% of Pull at Reduced Engine Speed—Two Hours	72.5
Bystander in 15th gear	88.0

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 18.4-38, 6, 12 *(83)*	Four 18.4-38, 6, 12 *(83)*
Ballast	—Liquid (each inner)	432 lb *(196 kg)*	None
	—Cast Iron (each)	None	None
Front Tires	—No., size, ply & psi *(kPa)*	Two 11.00-16; 8, 40 *(275)*	Two 11.00-16; 8, 40 *(275)*
Ballast	—Liquid (each)	None	None
	—Cast Iron (each)	68 lb *(31 kg)*	None
Height of Drawbar		23 in *(585 mm)*	23 in *(585 mm)*
Static Weight with Operator	—Rear	9950 lb *(4513 kg)*	9085 lb *(4121 kg)*
	—Front	3735 lb *(1694 kg)*	3600 lb *(1633 kg)*
	—Total	13685 lb *(6207 kg)*	12685 lb *(5754 kg)*

REPAIRS AND ADJUSTMENTS: Following the PTO test, the fuel shut off control cable was replaced.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 152°F *(66.8°C)*. Nine gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to chassis serial numbers RW4050P006510 and higher.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1591**, May 6, 1986.

LOUIS I. LEVITICUS
Engineer-in-Charge

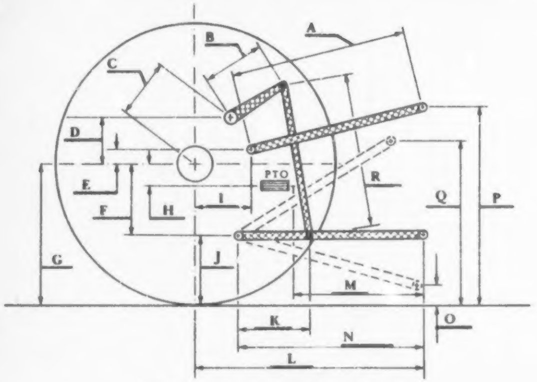
K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)* 2350 *(16200)*
Location pressure control valve
Hydraulic oil temperature °F (°C) 145 *(63)*
Location pump inlet

	Maximum Lift Capacity		Lift Capacity for Transport		Maximum Lift Capacity with optional boost cylinder	
QUICK ATTACH	no		no		no	
CATEGORY	2		2		2	
Load lbs *(kg)*	**6048	*(2743)*	4452	*(2019)*	***7220	*(3275)*
TIME sec	7.67		2.06		8.55	
HITCH POINT MOVEMENT in *(mm)*						
Lowest position	11.3	*(287)*	8.0	*(203)*	11.3	*(287)*
Top of timed range	35.3	*(897)*	32.7	*(831)*	35.3	*(897)*
Highest position	36.4	*(925)*	32.7	*(831)*	36.2	*(919)*
LOAD CG MOVEMENT in *(mm)*						
Lowest position	10.0	*(254)*	6.5	*(165)*	9.9	*(251)*
Top of timed range	38.6	*(980)*	35.2	*(894)*	38.8	*(986)*
Highest position	40.2	*(1021)*	35.2	*(894)*	40.2	*(1021)*

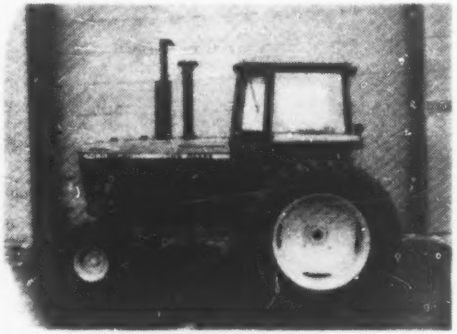
** The manufacturer's claimed capacity was 6294 lbs *(2855 kg)*
*** The manufacturer's claimed capacity was 7418 lbs *(3365 kg)*



Hitch Dimensions as Tested — No Load

	inch	mm
A	27.4	695
B	11.5	292
*C	11.3	287
D	10.9	278
E	5.5	140
F	10.2	259
G	31.7	805
H	5.5	140
I	13.5	343
J	21.5	546
K	23.1	587
L	41.2	1046
M	21.5	547
N	36.7	932
O	8.0	203
P	40.5	1029
Q	35.0	889
R	33.0	838

* rockshaft is ahead of rear axle.



John Deere 4050 Powershift Diesel

NEBRASKA TRACTOR TEST 1592—STEIGER BEARCAT 1000 DIESEL
12 SPEED
(CATERPILLAR ENGINE)

POWER TAKE-OFF PERFORMANCE

Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg (kPa)
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed — Two hours (PTO Speed — 1001 rpm)								
218.00 (162.56)	2100	13.126 (49.688)	0.422 (0.257)	16.61 (3.272)	186 (85.6)	63 (17.4)	76 (24.4)	28.74 (97.05)
VARYING POWER AND FUEL CONSUMPTION — Two Hours								
190.59 (142.12)	2160	12.047 (45.603)	0.443 (0.270)	15.82 (3.116)	183 (83.6)	69 (20.5)	77 (25.0)	......
0.00 (0.00)	2271	3.698 (13.997)	......	......	180 (82.2)	69 (20.5)	76 (24.2)	......
98.16 (73.19)	2223	7.708 (29.176)	0.550 (0.335)	12.74 (2.509)	181 (82.5)	69 (20.6)	76 (24.2)	......
218.76 (163.13)	2100	13.100 (49.588)	0.420 (0.255)	16.70 (3.290)	186 (85.6)	74 (23.3)	78 (25.6)	......
49.45 (36.88)	2248	5.919 (22.405)	0.839 (0.510)	8.36 (1.646)	180 (82.2)	70 (21.1)	77 (25.0)	......
145.22 (108.29)	2196	9.890 (37.438)	0.477 (0.290)	14.68 (2.891)	181 (82.8)	70 (20.9)	78 (25.6)	......
Av 117.05 *Av (87.27)*	**2200**	**8.727** *(33.035)*	**0.523** *(0.318)*	**13.41** *(2.642)*	**182** *(83.1)*	**70** *(21.1)*	**77** *(24.9)*	**28.70** *(96.93)*

DRAWBAR PERFORMANCE

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank shaft speed rpm	Slip %	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom inch Hg (kPa)
Maximum Available Power — Two Hours 7th Gear											
192.82 (143.79)	10935 (48.64)	6.61 (10.64)	2100	2.40	13.138 (49.734)	0.478 (0.291)	14.68 (2.891)	186 (85.6)	65 (18.1)	73 (22.8)	28.63 (96.66)
75% of Pull at Maximum Power — Ten Hours 7th Gear											
152.40 (113.65)	8302 (36.93)	6.88 (11.08)	2173	1.87	11.228 (42.504)	0.516 (0.314)	13.57 (2.674)	183 (83.9)	64 (17.8)	72 (22.2)	28.78 (97.17)
50% of Pull at Maximum Power — Two Hours 7th Gear											
103.76 (77.37)	5535 (24.62)	7.03 (11.31)	2207	1.27	8.914 (33.838)	0.604 (0.368)	11.60 (2.285)	182 (83.3)	66 (18.9)	74 (23.3)	28.73 (97.00)
50% of Pull at Reduced Engine Speed — Two Hours 9th Gear											
103.81 (77.41)	5536 (24.62)	7.03 (11.32)	1494	1.31	7.118 (26.946)	0.481 (0.292)	14.58 (2.873)	181 (82.8)	68 (20.0)	79 (25.8)	28.72 (96.98)

MAXIMUM POWER IN SELECTED GEARS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank shaft speed rpm	Slip %	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom inch Hg (kPa)
169.55 (126.44)	28566 (127.07)	2.23 (3.58)	2139	14.54	2nd Gear			181 (82.8)	63 (17.2)	67 (19.4)	28.71 (96.95)
187.98 (140.17)	21088 (107.15)	2.93 (4.71)	2101	7.11	3rd Gear			183 (83.9)	64 (17.8)	73 (22.8)	28.63 (96.68)
193.53 (144.32)	19809 (88.11)	3.66 (5.90)	2101	4.97	4th Gear			183 (83.9)	64 (17.8)	73 (22.9)	28.61 (96.61)
195.49 (145.78)	16472 (73.27)	4.45 (7.16)	2101	3.86	5th Gear			185 (85.0)	64 (17.8)	73 (22.8)	28.66 (96.78)
191.51 (143.05)	13215 (58.77)	5.52 (8.88)	2098	2.80	6th Gear			185 (84.7)	64 (17.8)	73 (22.8)	28.69 (96.88)
195.08 (145.47)	11069 (49.24)	6.61 (10.64)	2098	2.40	7th Gear			186 (85.6)	64 (17.8)	73 (22.8)	28.63 (96.68)
193.66 (144.41)	9107 (40.51)	7.97 (12.83)	2100	1.90	8th Gear			186 (85.3)	67 (19.4)	76 (24.4)	28.69 (96.88)
190.05 (141.72)	7231 (32.17)	9.86 (15.86)	2101	1.48	9th Gear			185 (84.7)	66 (18.9)	75 (23.9)	28.69 (96.88)

Department of Agricultural Engineering

Dates of Test: May 6 to 13, 1986

Manufacturer: STEIGER TRACTOR, INC., 406 Main Avenue, Fargo, North Dakota 58126

FUEL, OIL AND TIME: Fuel No. 2 Diesel **Cetane No.** 46.9 (rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F** *(15/15°C)* 0.8419 **Fuel weight** 7.010 lbs/gal *(0.840 kg/l)* **Oil SAE** 15W-40 **API service classification** CD-SF-CC **To motor** 5.892 gal *(22.303 l)* **Drained from motor** 5.237 gal *(19.824 l)* **Transmission and hydraulic lubricant** Steiger hydraulic transmission oil **Final drive lubricant** SAE 80W-90 gear oil API GL-5 **Total time engine was operated** 39.0 hours

ENGINE: Make Caterpillar Diesel **Type** six cylinder vertical with turbocharger **Serial No.** 64704445 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.75" × 6.00" *(120.7 mm × 152.4 mm)* **Compression ratio** 15.0 to 1 **Displacement** 638 cu in *(10455 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic oil, radiator for transmission oil **Fuel filter** one paper cartridge and prestrainer **Muffler** vertical **Cooling medium temperature control** one thermostat.

CHASSIS: Type four wheel drive with duals **Serial No.** C09-6091 **Tread width** rear 64" *(1625 mm)* to 130" *(3302 mm)* front 64" *(1625 mm)* to 130" *(3302 mm)* **Wheel base** 130" *(3302 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center-line of rear wheels 72.0" *(1829 mm)* Vertical distance above roadway 46.0" *(1168 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled powershift **Advertised speeds mph** ***(km/h)*** first 2.0 *(3.3)* second 2.5 *(3.9)* third 3.0 *(4.9)* fourth 3.7 *(5.9)* fifth 4.4 *(7.1)* sixth 5.5 *(8.8)* seventh 6.5 *(10.5)* eighth 7.8 *(12.5)* ninth 9.6 *(15.4)* tenth 11.7 *(18.9)* eleventh 14.1 *(22.7)* twelfth 17.3 *(27.9)* reverse 2.7 *(4.3)*, 4.8 *(7.8)* **Clutch** wet multiple disc hydraulically power actuated by foot pedal **Brakes** caliper disc hydraulically operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 240" *(6.1 m)* left 240" *(6.1 m)* **Turning space diameter** (on concrete surface without brake) right 501" *(12.7 m)* left 501" *(12.7 m)* **Power take-off** 1001 rpm at 2100 engine rpm **Unladen tractor mass** 25395 lb *(11519 kg)*

Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Irvin T. Omtvedt, Dean and Director

LUGGING ABILITY IN 7th GEAR

Crankshaft Speed rpm	2098	1887	1684	1466	1253	1019
Pull—lbs *(kN)*	11069 *(49.24)*	12821 *(57.03)*	14339 *(63.78)*	14851 *(66.06)*	14873 *(66.16)*	14199 *(63.16)*
Increase in Pull %	0	16	30	34	34	28
Power—Hp *(kW)*	195.08 *(145.47)*	202.37 *(150.91)*	201.10 *(149.96)*	181.05 *(135.01)*	154.99 *(115.58)*	124.03 *(92.49)*
Speed—Mph *(km/h)*	6.61 *(10.64)*	5.92 *(9.53)*	5.26 *(8.46)*	4.57 *(7.36)*	3.91 *(6.29)*	3.28 *(5.27)*
Slip %	2.40	2.89	3.22	3.38	3.38	3.38

TRACTOR SOUND LEVEL WITH CAB

	dB(A)
Maximum Available Power—Two Hours	78.5
75% of Pull at Maximum Power—Ten Hours	77.0
50% of Pull at Maximum Power—Two Hours	77.5
50% of Pull at Reduced Engine Speed—Two Hours	76.0
Bystander in 12th gear	89.5

TIRES, BALLAST AND WEIGHT

		Without Ballast
Rear Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34, 8, inner 14 *(95)* outer 12 *(85)*
Ballast	—Liquid (each)	None
	—Cast Iron (each)	None
Front Tires	—No., size, ply & psi *(kPa)*	Four 23.1-34, 8, inner 14 *(95)* outer 12 *(85)*
Ballast	—Liquid (each)	None
	—Cast Iron (each)	None
Height of Drawbar		19 in *(483 mm)*
Static Weight with Operator	—Rear	12880 lb *(5842 kg)*
	—Front	15695 lb *(7119 kg)*
	—Total	28575 lb *(12961 kg)*

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)*	2500	*(17240)*	
Location	remote outlet		
Hydraulic oil temperature °F *(°C)*	133	*(56)*	
Location	charge pump inlet		
	Maximum Lift Capacity		**Lift Capacity for Transport**
QUICK ATTACH	yes		
CATEGORY	3		*not measured
LOAD lbs *(kg)*	12764	*(5790)*	
TIME sec	3.93		
HITCH POINT MOVEMENT in *(mm)*			
Lowest position	14.4	*(366)*	
Top of timed range	40.4	*(1026)*	
Highest position	40.5	*(1029)*	
LOAD CG MOVEMENT in *(mm)*			
Lowest position	14.6	*(371)*	
Top of timed range	42.3	*(1074)*	
Highest position	42.4	*(1077)*	

*Implement load capacity for transport purposes not specified by manufacturer

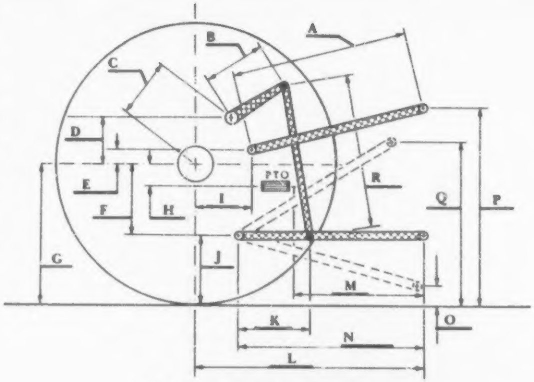
REPAIRS AND ADJUSTMENTS: Before starting the drawbar tests, the brake clearance was adjusted.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 145°F *(62.8°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to Bearcat 1000 models equipped with Caterpillar Diesel engines.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1592**, June 13, 1986.

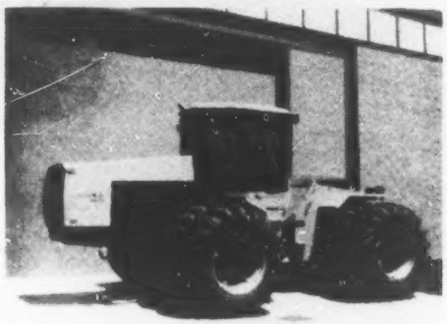
LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers



Hitch Dimensions as Tested — No Load

	inch	*mm*
A	29.1	*740*
B	21.0	*533*
C	25.8	*654*
D	25.1	*638*
E	11.4	*289*
F	9.9	*251*
G	32.7	*829*
H	9.6	*243*
I	23.3	*591*
J	22.8	*578*
K	23.0	*584*
L	52.7	*1338*
L'	57.7	*1465*
M	25.0	*635*
N	42.0	*1067*
O	8.0	*203*
P	44.8	*1137*
Q	39.6	*1006*
R	35.5	*902*



Steiger Bearcat 1000 Diesel

Agricultural Research Division
Institute of Agriculture and Natural Resources
University of Nebraska–Lincoln
Irvin T. Omtvedt, Dean and Director

NEBRASKA TRACTOR TEST 1593 — STEIGER COUGAR 1000 DIESEL 12 SPEED (CATERPILLAR ENGINE)

POWER TAKE-OFF PERFORMANCE

Power Hp (kW)	Crank shaft speed rpm	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temperature °F (°C) Cooling medium	Air wet bulb	Air dry bulb	Barometer inch Hg (kPa)
MAXIMUM POWER AND FUEL CONSUMPTION								
Rated Engine Speed — Two hours (PTO Speed — 1001 rpm)								
[illegible] (191.85)	2100	15.051 [illegible]	0.406 [illegible]	17.27 [illegible]	191 [illegible]	61 [illegible]	[illegible]	28.70 [illegible]
VARYING POWER AND FUEL CONSUMPTION — Two Hours								
225.92 (168.47)	2148	13.551 [illegible]	0.421 (0.256)	[illegible]	191 [illegible]	66 [illegible]	[illegible]	
0.00 (0.00)	2253	3.795 [illegible]			185 [illegible]	66 [illegible]	[illegible]	
115.97 (86.48)	2209	8.440 [illegible]	0.511 [illegible]	13.73 [illegible]	190 [illegible]	66 [illegible]	78 [illegible]	
260.95 (194.59)	2100	14.996 [illegible]	0.403 [illegible]	17.40 [illegible]	191 [illegible]	67 [illegible]	80 [illegible]	
58.69 (43.76)	2251	6.216 [illegible]	0.743 [illegible]	9.44 [illegible]	191 [illegible]	67 [illegible]	80 [illegible]	
171.91 (128.22)	2177	10.881 [illegible]	0.444 [illegible]	15.80 [illegible]	192 [illegible]	66 [illegible]	82 [illegible]	
Av 138.91 **Av (103.59)**	**2186**	**9.648** **(36.521)**	**0.487** **(0.296)**	**14.40** **(2.836)**	**191** **(88.6)**	**66** **(19.1)**	**79** **(26.0)**	**28.70** **(97.22)**

DRAWBAR PERFORMANCE

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank shaft speed rpm	Slip %	Fuel Consumption gal/hr (l/h)	lb/hp.hr (kg/kW.h)	Hp.hr/gal (kW.h/l)	Temp. °F (°C) Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
Maximum Available Power — Two Hours 7th Gear											
225.27 (167.98)	12820 (57.03)	6.59 (10.60)	2099	2.71	14.846 [illegible]	0.462 [illegible]	15.17 [illegible]	191 [illegible]	58 [illegible]	60 [illegible]	28.81 [illegible]
75% of Pull at Maximum Power — Ten Hours 7th Gear											
178.90 (133.41)	9830 (43.73)	6.82 (10.98)	2157	1.92	12.501 (47.321)	0.490 [illegible]	14.31 [illegible]	191 [illegible]	62 [illegible]	71 [illegible]	28.64 [illegible]
50% of Pull at Maximum Power — Two Hours 7th Gear											
121.93 (90.92)	6554 (29.15)	6.98 (11.23)	2191	1.33	9.731 [illegible]	0.560 [illegible]	12.53 [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
50% of Pull at Reduced Engine Speed — Two Hours 9th Gear											
121.86 (90.87)	6553 (29.15)	6.97 (11.22)	1183	1.33	8.108 [illegible]	0.467 [illegible]	15.03 [illegible]	192 [illegible]	[illegible]	[illegible]	[illegible]

MAXIMUM POWER IN SELECTED GEARS

Power Hp (kW)	Drawbar pull lbs (kN)	Speed mph (km/h)	Crank shaft speed rpm	Slip %	Gear	Cooling med	Air wet bulb	Air dry bulb	Barom. inch Hg (kPa)
184.41 [illegible]	30003 [illegible]	2.23 [illegible]	2140	11.19	2nd Gear	[illegible]	[illegible]	[illegible]	[illegible]
218.71 (163.09)	28642 (127.41)	2.86 (4.61)	2098	8.89	3rd Gear	191	[illegible]	[illegible]	28.80
227.75 (169.83)	23460 (104.35)	3.64 [illegible]	2099	5.53	4th Gear	191	[illegible]	[illegible]	28.80
229.29 (170.98)	19413 (86.35)	4.43 (7.13)	2100	4.28	5th Gear	191	[illegible]	[illegible]	28.80
228.91 (170.70)	15602 (69.40)	5.50 (8.85)	2097	3.40	6th Gear	191	[illegible]	[illegible]	28.80
230.18 (171.65)	13107 (58.30)	6.59 (10.60)	2099	2.75	7th Gear	191	[illegible]	[illegible]	28.80
227.77 (169.85)	10769 (47.90)	7.93 (12.76)	2096	2.17	8th Gear	191	[illegible]	[illegible]	28.80
222.96 (166.26)	8517 (37.89)	9.82 (15.80)	2098	1.62	9th Gear	191	[illegible]	[illegible]	28.80

Department of Agricultural Engineering

Dates of Test: May 7 to 15, 1986

Manufacturer: STEIGER TRACTOR INC. [illegible] Main Avenue, Fargo, North Dakota 58126

FUEL, OIL AND TIME: **Fuel** No. 2 Diesel **Cetane No.** [illegible] (rating taken from oil company's inspection data) **Specific gravity converted to 60/60°F** *(15/15°C)* 0.8422 **Fuel weight** 7.012 lbs/gal *(0.840 kg/l)* **Oil SAE** 15W-40 **API service classification** CD/SF/CC **To motor** [illegible] gal *(28.229 l)* **Drained from motor** 5.901 gal *(22.339 l)* **Transmission and hydraulic lubricant** Steiger hydraulic transmission oil **Final drive lubricant** SAE 80W-90 gear oil API GL-5 **Total time engine was operated** 34.0 hours

ENGINE: **Make** Caterpillar Diesel **Type** six cylinder vertical with turbocharger and intercooler **Serial No.** 61Z01500 **Crankshaft** lengthwise **Rated rpm** 2100 **Bore and stroke** 4.75" × 6.00" *(120.7 mm × 152.4 mm)* **Compression ratio** 15.0 to 1 **Displacement** 638 cu in *(10455 ml)* **Starting system** 12 volt **Lubrication** pressure **Air cleaner** two paper elements and aspirator **Oil filter** one full flow cartridge **Oil cooler** engine coolant heat exchanger for crankcase oil, radiator for hydraulic oil, radiator for transmission oil **Fuel filter** one paper cartridge and prestrainer **Muffler** vertical **Cooling medium temperature control** one thermostat

CHASSIS: **Type** four wheel drive with duals **Serial No.** C11 6092 **Tread width** rear 64" *(1625 mm)* to 130" *(3302 mm)* front 64" *(1625 mm)* to 130" *(3302 mm)* **Wheel base** 130" *(3302 mm)* **Center of gravity** (without operator or ballast, with minimum tread, with fuel tank filled and tractor serviced for operation) Horizontal distance forward from center line of rear wheels 72" *(1829 mm)* Vertical distance above roadway 46" *(1168 mm)* Horizontal distance from center of rear wheel tread 0" *(0 mm)* to the right/left **Hydraulic control system** direct engine drive **Transmission** selective gear fixed ratio with full range operator controlled powershift **Advertised speeds mph (km/h)** first 2.4 *(3.9)* second 2.9 *(4.6)* third 3.0 *(4.8)* fourth 3.7 *(5.9)* fifth 4.4 *(7.1)* sixth 5.5 *(8.8)* seventh 6.5 *(10.5)* eighth 7.8 *(12.5)* ninth 9.6 *(15.4)* tenth 11.7 *(18.8)* eleventh 14.1 *(22.7)* twelfth 17.1 *(27.5)* reverse 2.9 *(4.7)*, 3.8 *(6.1)* **Clutch** wet multiple disc hydraulically power actuated by foot pedal **Brakes** caliper disc hydraulically operated by foot pedal **Steering** hydrostatic and articulated **Turning radius** (on concrete surface without brake) right 240" *(6.1 m)* left 240" *(6.1 m)* **Turning space diameter** (on concrete surface without brake) right 501" *(12.7 m)* left 501" *(12.7 m)* **Power take-off** 1001 rpm at 2100 engine rpm **Unladen tractor mass** 27100 lb *(12292 kg)*

REPAIRS AND ADJUSTMENTS: No repairs or adjustments.

LUGGING ABILITY IN 7th GEAR

Crankshaft Speed rpm	2099	1886	1682	1467	1259	1044
Pull—lbs (kN)	13107 (58.30)	14792 (65.80)	16361 (72.78)	17622 (78.39)	18272 (81.28)	17507 (77.88)
Increase in Pull %	0	13	25	34	39	34
Power—Hp (kW)	230.18 (171.65)	232.66 (173.49)	228.65 (170.50)	214.04 (159.61)	189.20 (141.09)	151.18 (112.73)
Speed—Mph (km/h)	6.59 (10.60)	5.90 (9.49)	5.24 (8.43)	4.55 (7.33)	3.88 (6.25)	3.24 (5.21)
Slip %	2.75	3.15	3.48	3.96	3.96	3.80

TRACTOR SOUND LEVEL WITH CAB	dB(A)
Maximum Available Power—Two Hours	80.0
75% of Pull at Maximum Power—Ten Hours	79.0
50% of Pull at Maximum Power—Two Hours	79.0
50% of Pull at Reduced Engine Speed—Two Hours	77.5
Bystander in 12th gear	90.0

TIRES, BALLAST AND WEIGHT		With Ballast	Without Ballast
Rear Tires	—No., Size, ply & psi (kPa)	Four 23.1-34; 8; inner 14 (95) outer 12 (85)	Four 23.1-34; 8; inner 14 (95) outer 12 (85)
Ballast	—Test equip. (each)	15 lb (7 kg)	None
	—Cast Iron (each)	None	None
Front Tires	—No., Size, ply & psi (kPa)	Four 23.1-34; 8; inner 14 (95) outer 12 (85)	Four 23.1-34; 8; inner 14 (95) outer 12 (85)
Ballast	—Liquid (each inner)	1380 lb (626 kg)	None
	—Cast Iron (each)	None	None
Height of Drawbar		19 in (483 mm)	19 in (483 mm)
Static Weight with Operator	—Rear	12800 lb (5806 kg)	12740 lb (5779 kg)
	—Front	18470 lb (8378 kg)	15710 lb (7126 kg)
	—Total	31270 lb (14184 kg)	28450 lb (12905 kg)

THREE POINT HITCH PERFORMANCE

Observed Maximum Pressure psi *(kPa)*	2500	*(17240)*	
Location	remote outlet		
Hydraulic oil temperature °F *(°C)*	135	*(57)*	
Location	charge pump inlet		
	Maximum Lift Capacity		**Lift Capacity for Transport**
QUICK ATTACH	yes		
CATEGORY	3		*not measured
LOAD lbs *(kg)*	12768	*(5791)*	
TIME sec	2.95		
HITCH POINT MOVEMENT in *(mm)*			
Lowest position	9.9	*(252)*	
Top of timed range	35.9	*(912)*	
Highest position	40.1	*(1019)*	
LOAD C.G. MOVEMENT in *(mm)*			
Lowest position	10.6	*(269)*	
Top of timed range	36.2	*(919)*	
Highest position	41.5	*(1054)*	

*Implement load capacity for transport purposes not specified by manufacturer.

REMARKS: All test results were determined from observed data obtained in accordance with SAE and ASAE test codes and the technically equivalent ISO test codes or official Nebraska test procedure. For the maximum power tests, the fuel temperature at the injection pump return was maintained at 161°F *(71.5°C)*. Eight gears were chosen between 15% slip and 10 mph *(16.1 km/h)*. The performance figures on this report apply to Cougar 1000 models equipped with Caterpillar Diesel engines.

We, the undersigned, certify that this is as true and correct report of official Tractor Test No. **1593**, June 15, 1986.

LOUIS I. LEVITICUS
Engineer-in-Charge

K. VON BARGEN
W. E. SPLINTER
L. L. BASHFORD
Board of Tractor Test Engineers

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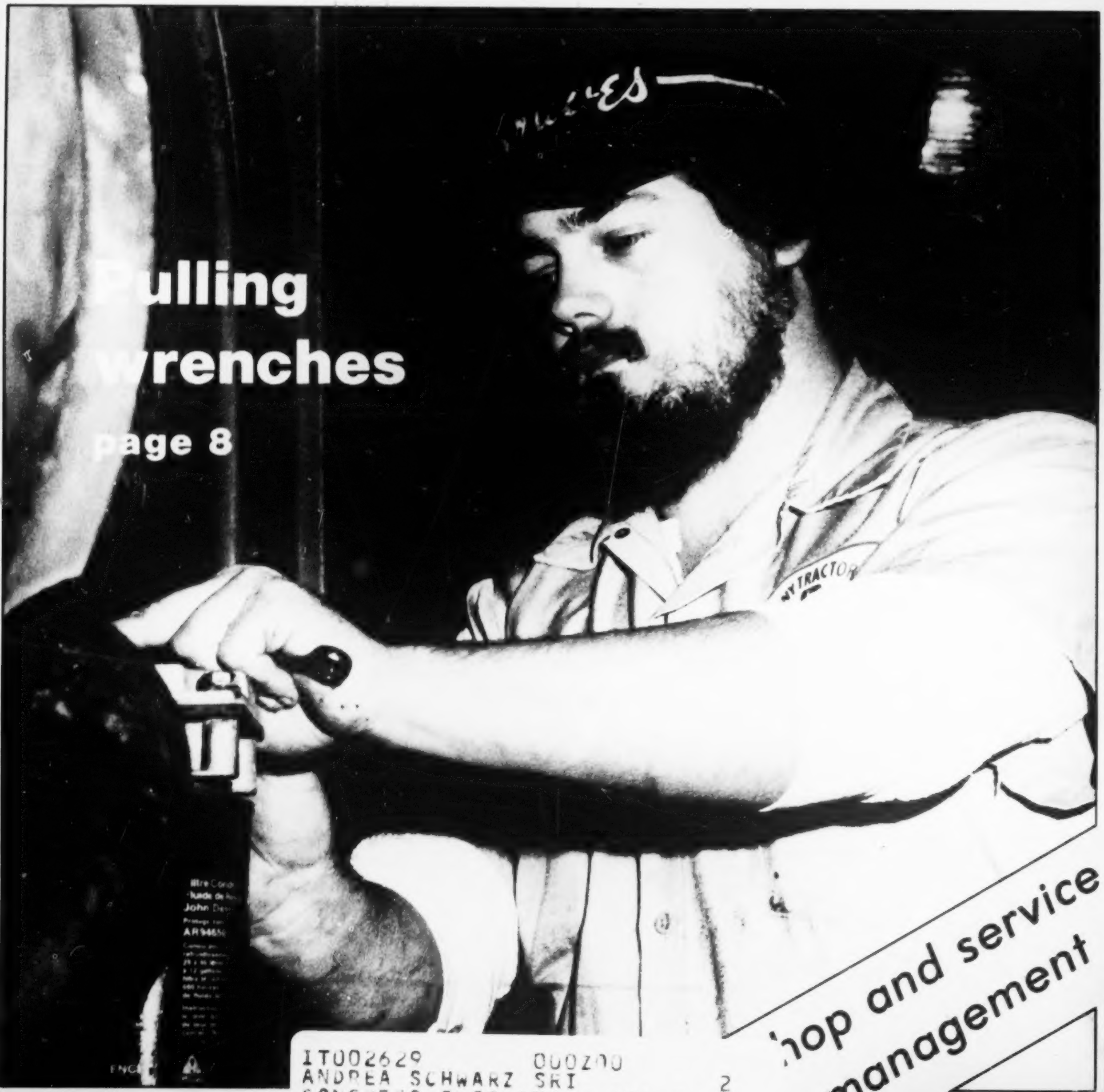
Implement & Tractor

The business magazine of the farm and industrial equipment industry
APRIL 1987

Superfarms and dealer service page 22



Pulling wrenches

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hop and service management

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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

April 1987 • Vol. 102 • No. 5

Our cover story

Albany Tractor faced a loss situation 10 years ago in its shop. Here's what one dealer did to turn things around.

8

Features

12: **Are good technicians** easy or hard to find? This question in a recent mini-survey of dealers produced some interesting comments.

14: **Bruce Coupe's Massey-Ferguson** franchise in California has been called by some other dealers "the model for the future."

16: **FIEI's annual winter conference** featured lively discussions on the future of the farm equipment industry. Editor Bill Fogarty reports on some of the more interesting ideas offered.

18: **A lot of problems** come to mind at the mention of a multi-franchise dealership. Billy Adams of North Carolina has met the problems head-on.

22: **Operators of superfarms** across the country talked with I&T about their views on service work done in their own shops and work done in their dealers' shops.

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EDITOR'S NOTEBOOK

By Bill Fogarty

Has retail selling been de-professionalized?

For years now, I've had guys buttonholing me at industry gatherings or calling me on the phone about the big discount programs. They say something like: "This radical discounting has got to stop. It's madness and it's going to destroy the industry if it keeps on. You ought to write an editorial telling them to quit it *now*."

The answer to that one, of course, is that if I ever find that readers will do what I tell 'em to, I'll just ask them to mail their donations to my Swiss bank account, and that will be my last editorial.

The fact is, no editorial or anything else was ever going to impede the radical discounting that we've seen in recent years. It was brought about by incredibly abrupt changes in the world supply of and demand for agricultural products and other shifts in the world economy. It was complicated by a failure of the farm equipment industry — biggies and little guys alike — to recognize the nature of these changes until they were sitting in our laps.

What could have been done with that ocean of inventory other than cutting price to sell it off as fast as possible? (Well, they didn't have to keep adding to inventory the way they were doing for a while, but that was secondary.) All that stuff out there was financed by banks that used to proclaim their love and devotion to agriculture and to everything connected with it, but after a while, they got itchy about all that money tied up in equipment. They wanted their high-interest money back fast, and it got so that it was less agony for a company to sell its machines at drastic cuts in price than to hold on to them and hope for better times.

Backing off. And now the word is out that the discounting, or at least the *drastic* discounting, is behind us. Marketing executives from several companies have commented to me that the other guys (it's always the other guys, of course) have finally come to their senses and backed off of the big discounts. On major high-ticket items, anyway. And except for something referred to as "transactional discounts." (A transactional discount can materialize, I'm told, when there's a very competitive situation and the dealer needs something knocked off the price in order to make a deal.)

To whatever extent the manufacturers are backing off of their super discounts, it seems to make a lot of sense.

For one thing, several large mergers and acquisitions have taken place in recent years and some management teams now have to show their boards

INVENTORY WATCH

What's happening to stockpiles in relation to sales.

Equipment	Inventory Levels Dec. 31, 1985	July 31, 1986	Aug. 31, 1986	Sept. 30, 1986	Oct. 31, 1986	Nov. 30, 1986	Dec. 31, 1986	12-Month Sales, Jan. 1, 1986 Dec. 31, 1986
Tractors								
Under 40 hp	46,559	50,905	52,872	57,108	57,880	59,141	61,842	61,648
40-99 hp	25,658	26,005	25,417	24,915	24,774	23,560	23,520	30,848
100 hp and over	22,243	16,986	16,783	16,299	14,901	14,228	13,805	14,262
Four-wheel drive	2,889	2,429	2,372	2,247	2,092	1,956	1,660	2,037
Total Tractors	**97,349**	**96,378**	**97,444**	**100,569**	**98,647**	**103,684**	**101,427**	**108,795**
S-P Combines	6,685	7,403	6,037	5,624	4,580	4,094	4,271	7,660

Source: Farm & Industrial Equipment Institute

FOR DEALERS ONLY: Mini-Survey suggests wage isn't everything

Finding good technicians

By Bill Fogarty

A DUMB QUESTION sometimes gets a better answer than it deserves. Here's a case in which our basic dumb question produced some very thought-provoking material for those involved with service personnel matters.

The dumb question: "Are good technicians easy or hard to get?" I&T asked it as one of our recent *For Dealers Only* mini-surveys and 55 dealers responded, offering some insight into their experiences over the past two years at hiring technicians for the shop.

How does one quantify "easy" and "hard" in a search for personnel? By itself, the basic question takes one nowhere, but some of the answers were very productive.

For the record, 23 dealers found it difficult to get the technicians they needed in the past two years, nine found it easy, and 16 thought it about routine, or what they might have reasonably expected.

One of the dealers who termed the task "average" said his dealership had experienced 13 departures from the shop over the past two years and had taken on 15 new service hands!

Little correlation

Taken together, our 55 dealers hired a total of 147 service technicians over the two years. We thought that by asking them to state their starting hourly wage for service technicians at various levels of training and experience, and then comparing the rates of the "easy," "difficult," and "average" dealers, we might find a correlation. In other words, would some dealers have experienced a difficult time hiring their mechanics because they paid low wages?

Undoubtedly, that was true in a few cases, but look at the table that accompanies this report: There is very little or no correlation between paying well and hiring easily, or paying low and having search problems.

Then how about geography? Maybe some dealers had trouble because, even though they might have offered more per hour than some national average, they were below the local starting pay norms.

No single factor

So I&T arranged the respondents by state, where indicated. Again, no correlation was apparent. For instance, three Montana dealers responded: Mr. Easy started inexperienced vo-tech grads at $5.50 per hour; Mr. Average paid $5.00; and Mr. Difficult started them at $6.00. An Iowa dealer, paying $6.00, said the search was difficult, while another found it easy at $3.50.

What is one to conclude? It may be that money is important, but not a totally determining factor in terms of the ease or difficulty of hiring service personnel. It may also be that there is a wide variation in supply-demand factors for skilled labor from one area's market to another, even though they might be close geographically.

The lesson: Dealers are probably well-advised to participate in their associations' wage and salary surveys and study the findings carefully. Once that's done, they probably should conduct their own mini-surveys of going wages at other farm and industrial equipment dealers. Service department consultants also recommend that dealers probe what local auto and truck dealers, diesel shops, and similar technician employers are paying.

WHAT'S YOUR STARTING WAGE FOR TECHNICIANS?

	(Average Hourly Pay)		
Dealer Groups	Vocational Training – No Experience	Vocational Training – Up to Four Years Experience	Vocational Training – Over Four Years Experience
All dealers	5.70	7.00	7.80
Easy to find	5.60	6.60	7.60
Routine to find	5.80	7.45	8.20
Difficult to find	5.70	6.90	7.75
Haven't had to find any	5.40	7.40	8.75

Sources of employees

Of the 147 technicians our survey dealers hired over two years, 105 came in as replacements of departed employees. The other 42 were additions. Where did they come from? There were two dominant sources — direct from trade schools and from other dealerships.

We asked the dealers if any technicians had left their employ in the past two years. Ten dealers reported that there were no departures, but 44 dealers experienced 105 terminations from their technical staffs — and most of them told us why.

Nine technicians left because there wasn't enough work for them. Dealers fired 18 because of insufficient technical skills and eight others for attitude. Five retired. There were 32 technicians who quit for jobs in other fields, and 22 who left for better jobs elsewhere as technicians.

How do dealers feel about state vocational training programs, which might be a source for starting technicians? Is there such a program — or does the dealer know? And what does he think of the graduates? Are they trained reasonably to an entry level and are there enough of them?

Of 54 respondents, 28 said their state had such a program, 12 said there wasn't one, and 14 just plain didn't know. The interesting thing is, some of the dealers who said there's no school were in states where other dealers said there were indeed such training programs. Similarly, some "don't knows" were in states that apparently have such programs.

Mixed reviews

Commenting on the schools, 11 dealers said they were of sufficient quality to train students to an entry level — *and 16 other dealers said they were not adequate.* As for quantity, eight thought enough graduates were coming out to meet the need, and 17 thought there weren't enough. However, some of the dealers who said there were enough were among those who thought quality was insufficient. In other words, if they are turning out bad grads, they are turning out enough of them!

To the writer, the response suggests that dealer associations in states with vo-tech programs need to do two things: (1) They need to be certain that all their members are aware of such programs and what they offer, and (2) they need to get involved in cooperative programs in which they can provide qualitative guidance as a means of upgrading the product. Or it may be necessary for the association — or some individual parties — to get involved politically to secure better funding for potentially good programs.

Next two years

As for the 55 dealers who had hired 147 service technicians in the past two years, what do they see for the next two years?

Forty-two said they expect to be seeking new technicians again in the next two years, while 12 do not. The dealers were asked to specify if they expected to be picking up replacements for departed technicians, additions to the staff, or both. Most respondents were optimistic about growth and about holding the staff they now have, 24 expect to be making additions only, five expect both, and 14 others will be looking for replacements only.

This suggests to the writer that the hunt for good service technicians will continue, and that regional and state associations have an opportunity to develop and refine their member services in this area. If the observations of these participating dealers reflect the mainstream, the vocational training institutions that turn out entry-level technicians for the farm and industrial equipment industry need help in expanding and upgrading their level of instruction.

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1987 sales start with a thud

Retail sales of major farm equipment items in the U.S. in the first two months of 1987 were down substantially in most categories, according to the flash report of the Farm & Industrial Equipment Institute.

The FIEI always points out, however, that its flash reports are subject to revision and that the seasonal nature of the business makes monthly comparisons a practice deserving "extreme caution."

Unit Retail Sales

	February			January-February		
	1987	1986	%	1987	1986	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	2,477	2,479	(.1)	5,429	5,628	(3.5)
40 & Under 100 HP	1,323	1,810	(26.9)	3,391	4,264	(20.5)
100 & Under 140 HP	115	616	(81.3)	468	1,026	(54.4)
140 HP & Over	208	722	(71.2)	856	1,910	(55.2)
Total 2-Wheel Drive	4,123	5,627	(26.7)	10,144	12,828	(20.9)
4-Wheel Drive						
Under 200 HP	35	48	(27.1)	66	118	(44.1)
200 HP & Over	54	81	(33.3)	144	285	(49.5)
Total 4-Wheel Drive	89	129	(31.0)	210	403	(47.9)
Total Farm Wheel Tractors	4,212	5,756	(26.8)	10,354	13,231	(21.7)
Combines Self-Propelled)	73	231	(68.4)	247	857	(71.2)
Balers (Bales under 200 lbs)	101	149	(32.2)	335	398	(15.8)
Forage Harvesters (Shear Bar Type)	47	35	34.3	132	122	8.2
Mower Conditioners	257	230	11.7	651	655	(.6)

Workshops planned for service managers

How many dealers have service managers who are ready for some advanced training in their profession? The number might not be large, but some dealers I&T has talked with in recent years have indicated that they aimed at having their service operations on a par with those in similar industries.

Here's a chance for them to do something. Three major universities, in co-sponsoring with the National Association of Service Managers, are offering a series of eight educational workshops in 1987 and 1988 focusing on the needs of product service managers, regardless of industry.

The universities: Syracuse, Texas at Arlington, and Wisconsin/Madison.

The three-day workshops, which can be taken separately, are: (1) Managerial and Leadership Skills for the Service Manager; (2) Planning and Budgeting; (3) Marketing and Customer Services; (4) Field Service Management; (5) Service Parts Management; (6) Building an Effective Service Force; (7) Managing for Customer Satisfaction; and (8) Managerial Communications.

Further information is available from Syracuse University (315-423-3291), University of Texas at Arlington (817-273-2290) and University of Wisconsin/Madison (800-362-3020 in Wisconsin, 800-262-6243 outside). National Association of Service Managers is based at 60 Revere Drive, Northbrook, Ill. 60062, telephone 312-480-9575.

Imports topped exports in 1986

Farm equipment imports to the United States last year were $1.63 billion, exceeding for the first time in modern history U.S. farm equipment exports, which were $1.47 billion. As recently as 1982, exports ran ahead of imports by $1.2 billion.

Exports in 1985 were $1.85 billion and imports were $1.56 billion. Principal 1986 declines came in sales to Canada, down 18 percent to $649 million; to Mexico, down 64 percent to $76 million; to Australia, down 66 percent to $48 million; to West Germany, down 9 percent to $52 million; to South Africa, down 15 percent to $25 million; and to Egypt, down 30 percent to $16 million.

Exports in 1986 improved, however, to France, up 13 percent to $68 million; to Spain, up 113 percent to $20 million; to Belgium, up 73 percent to $41 million; to Venezuela, up 25 percent to $54 million; China, up 83 percent to $12 million.

Import volume was down from Canada by 12 percent to $366 million. Increases came from Britain, up 13 percent to $234 million; Japan, up 18 percent to $419 million; West Germany, up 13 percent to $253 million. Other major sources were France at $65 million, down 6 percent; Italy at $119 million, down 3 percent; and the Netherlands, down 12 percent at $30 million.

(Source: U.S. Dept. of Commerce, International Trade Administration, Office of Capital Goods and International Construction.)

Briefly...

Ag-Bag Corp., Astoria, Ore., has announced that it will appeal a court judgment that it had distributed false statements concerning the financial condition of Blair Mfg. Co., Blair, Neb. The decision was rendered in Washington County (Neb.) District Court.

Hans Becherer succeeds Bartlett as Deere president

Hans W. Becherer has been named by the Deere & Co. board of directors as president and chief operating officer, succeeding Boyd C. Bartlett, who retired effective March 31, as previously announced.

Becherer, 51, had been executive vice-president with responsibilities for worldwide farm equipment and consumer products manufacturing and marketing. He joined Deere in 1962 and has held executive positions in both Europe and the United States.

Firestone exits farm tire business in United States

The Firestone Tire & Rubber Co. will close its plants at Des Moines, Iowa, Bloomington, Ill., and Oklahoma City, Okla., on or before Sept. 15. The move will take them out of the agricultural tire business in North America, according to Bob Troyer, a company spokesman.

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5/22/87

I&T

100 YEARS OF LEADERSHIP

The business magazine of the farm and industrial equipment industry

May 1987

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HAY EQUIPMENT TRENDS

PAGE 9

Grain handling, forage and hay equipment

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Farm Press Publications, Inc.

Our cover story

Why have drum and disk mowers and mower-conditioners come on so strong? A look at this and other trends in hay equipment on....

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11: ***I&T* takes a look** at some of the new haying equipment available this year.

13: **Here's one dealer** who's still using the one-on-one demonstration to make sales.

15: **Action in the grain handling** industry is better than expected. Editor Bill Fogarty explains some of the reasons.

19: **This California distributor** has found market niches to fill successfully.

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INDUSTRY UPDATE

Winter sales chill hangs on

Despite the feelings of optimism that are showing themselves at many industry gatherings so far this year, the flash report of U.S. retail sales of principal machines, issued by the Farm & Industrial Equipment Institute, reflects little action in the first quarter of 1987.

	Unit Retail Sales					
	March			January-March		
Equipment	1987	1986	Pct. Change	1987	1986	Pct. Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	4,747	5,473	(13.3)	10,177	11,101	(8.3)
40 & Under 100 HP	2,238	1,995	12.2	5,623	6,259	(10.2)
100 & Under 140 HP	187	341	(45.2)	656	1,367	(52.0)
140 HP & Over	372	517	(28.0)	1,226	2,427	(49.5)
Total 2-Wheel Drive	**7,544**	**8,326**	**(9.4)**	**17,682**	**21,154**	**(16.4)**
4-Wheel Drive						
Under 200 HP	51	45	13.3	117	163	(28.2)
200 HP & Over	59	63	(6.3)	204	348	(41.4)
Total 4-Wheel Drive	**110**	**108**	**1.9**	**321**	**511**	**(37.2)**
Total Farm Wheel Tractors	**7,654**	**8,434**	**(9.2)**	**18,003**	**21,665**	**(16.9)**
Combines (Self-Propelled)	76	156	(51.3)	324	1,013	(68.0)
Balers (Bales under 200 lbs)	177	278	(36.3)	513	676	(24.1)
Forage Harvesters (Shear Bar Type)	93	56	66.1	226	178	27.0
Mower Conditioners	447	653	(31.5)	1,100	1,308	(15.9)

Long N.C. jumping back into action

Long Mfg. N.C., Inc., Tarboro, N.C., has been reorganized and recapitalized after having been in Chapter 11 in 1986. New president and chief executive officer is Anthony C. Alvarez; David Walsh is executive vice-president of operations.

There are now three separate marketing divisions — Agricultural Equipment Products, Grain Handlling and Storage Products, and Woodstove Products. The production facility at Davenport, Iowa, has been closed and the company is no longer marketing glass lined silos and water storage tanks. All branch locations have been closed and consolidated at Tarboro.

According to Norman Cox, manager of the Agricultural Equipment Div., the Long line will continue to include tractors, implements, irrigation equipment and tillers.

"We just placed an order for 1,000 tractors," he said. Long imports the Universal tractor from Romania and adds components and features at the Tarbobo plant.

Long also continues to market tractors in South America and Central America under the Long name, as well as grain storage units around the world, Cox said.

Kuhn acquires Huard, French plow maker

Two major European shortline manufacturers, one with extensive North American operations, are being joined. Kuhn SA, Saverne, France, makers of hay handling and power tillage lines, has acquired Huard SA, Chateaubriand, France, one of the world's largest makers of plows.

The combined volumes of the two firms, according to Kuhn, is about 1 billion French francs (about $165 million). Kuhn has a subsidiary, Kuhn Farm Machinery, Inc., at Vernon, N.Y.

Shortliners report sales increases for five months

The first upbeat survey report of the year has been issued by the Farm Equipment Manufacturers Association. Fourteen officers, directors and past presidents of the organization said that as of March 1 their companies had experienced a median 8 percent increase in sales over the previous five months compared with the same period a year earlier. Nine of the 14 companies had increases, four had declines and one stayed the same.

Expectations are for a 10 percent volume increase in 1987. Last October, the same group had forecast a 15 percent median sales decline for 1987.

Orders on the books as of March 1 were reported up a median 13 percent compared with a year earlier. Finished goods inventory was reported down a median 13 percent from March 1, 1986.

IMT Tractor signs distributor

IMT Tractor Company of Belgrade, Yugoslavia, has signed a distributor contract with Robison & Woods Tractor Company of Guntown, Miss., to distribute its tractors in 16 states. IMT Tractor Company has been manufacturing tractors since 1955 when it signed a licensing agreement with Massey-Ferguson and Perkins diesel engines.

The IMT Tractor carries the licensed Perkins diesel engine and C.A.V. fuel injection pumps.

IMT tractors have a one-year warranty and, according to R & W's Charles Woods, have good parts availability from several different sources. The two principals of Robison & Woods Tractor Company have many years of experience in the tractor business. Doug Robison has been a Massey-Ferguson dealer for the past 25 years and Charles Woods has worked for Massey-Ferguson as a service representative. R & W Tractor Co. has purchased over 450 IMT tractors during the past year.

Briefly...

Hesston Corp.'s principal owner, Fiat Trattori S.p.A., has issued an offer to holders of Hesston common and preferred stock as a move to acquire 100 percent control of the company. The offer is for $4 for each share of common and $12.50 for each share of cumulative convertible preferred. According to a Hesston spokesman, Fiat intends to refinance the company because it intends to stay in the U.S. market.

Farmhand, Inc., Excelsior, Minn., has reached an agreement with Agricredit Acceptance Corp. to offer retail financing options on its product lines. Agricredit began as a captive finance subsidiary of Massey-Ferguson. It now functions as an independent financing enterprise while still part of the Varity organization.

C3450-1
6/24/87

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Implement &Tractor

The business magazine of the farm and industrial equipment industry June 1987

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AG DEALER MOVES INTO TALL TIMBER

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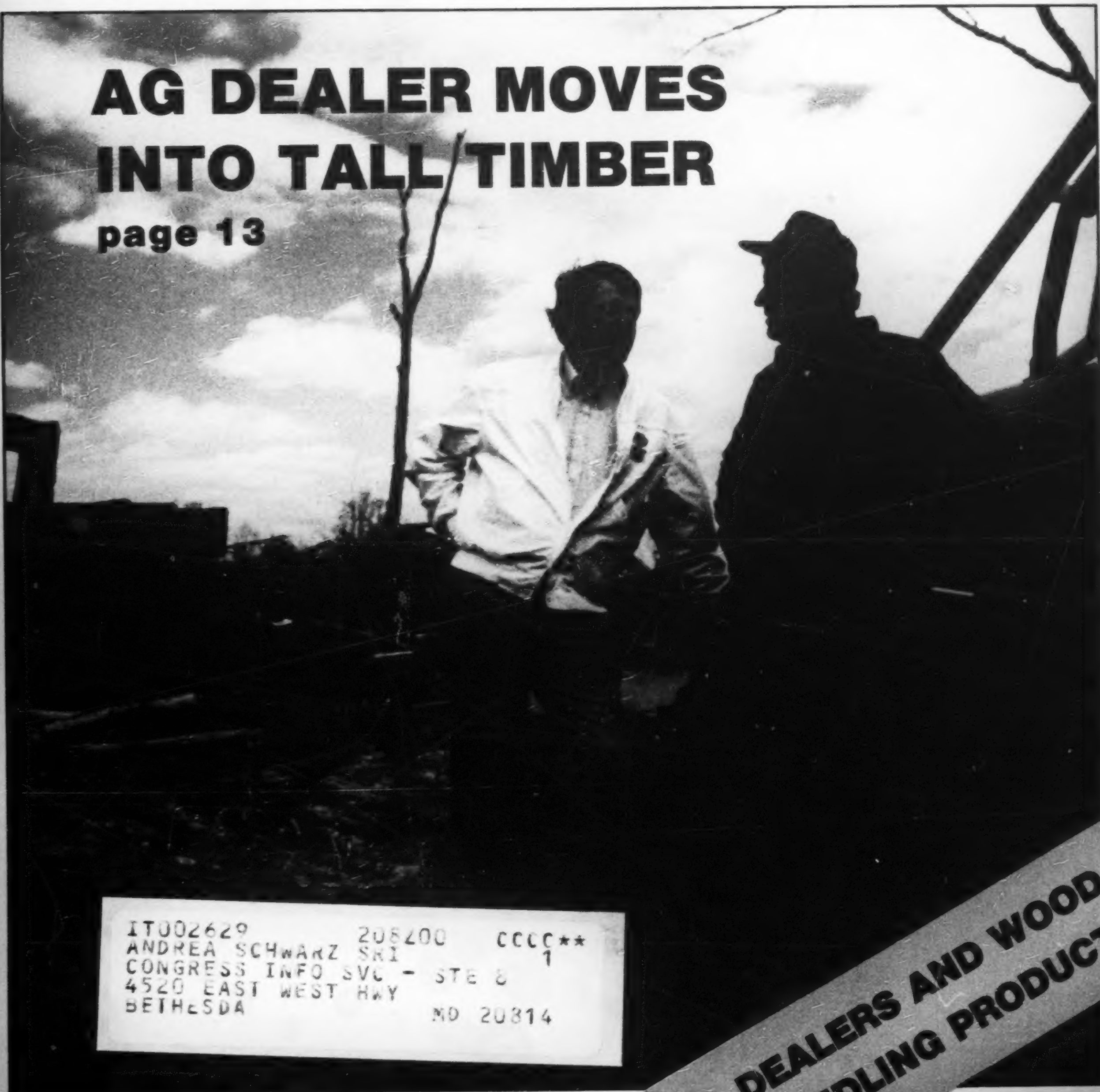

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DEALERS AND WOOD HANDLING PRODUCTS

I&T 100 YEARS OF LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

June 1987 • Vol. 102 • No. 7

Our cover story

To make it in the forestry equipment business, says John Tulloss, "we had to get out and meet those people, learn their needs and how they wanted to be treated."

Features

13: **This North Carolina** ag equipment dealer recognized the opportunity in industrial and forestry equipment and has built a dealership with balance and profitability.

15: **Dealers willing** to provide capable chain saw service are attracting quality-conscious consumers away from the mass merchandisers who have been such a big factor in recent years.

17: **Deutz-Allis** tells its dealers: "Take a look at us. We're a long-liner again and we want to supply *all* your needs."

29: **A search for margin** will attract many dealers to the July 27-29 Lawn, Garden and Power Equipment Expo in Louisville.

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Retail Report: Soft tractor sales volume persists in April

U.S. retail sales of tractors were down 13.6 percent in the first four months of 1987, according to the Farm & Industrial Equipment Institute's flash report. Even the usual source of strength, Japanese-made tractors under 40 hp, continued their decline. (Supplies of these tractors continue to rise. See "Inventory Watch.")

	Unit Retail Sales					
	April			January-April		
Equipment	**1987**	**1986**	**%**	**1987**	**1986**	**%**
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	7,801	8,542	(8.7)	18,144	19,643	(7.6)
40 & Under 100 HP	3,236	3,313	(2.3)	8,750	9,572	(8.6)
100 & Under 140 HP	386	438	(11.9)	1,051	1,805	(41.8)
140 HP & Over	717	1,036	(30.8)	1,935	3,463	(44.1)
Total 2-Wheel Drive	**12,140**	**13,329**	**(8.9)**	**29,880**	**34,483**	**(13.3)**
4-Wheel Drive						
Under 200 HP	74	42	76.2	191	205	(6.8)
200 HP & Over	88	112	(21.4)	292	460	(36.5)
Total 4-Wheel Drive	**162**	**154**	**5.2**	**483**	**665**	**(27.4)**
Total Farm Wheel Tractors	**12,302**	**13,483**	**(8.8)**	**30,363**	**35,148**	**(13.6)**
Combines (Self-Propelled)	171	149	14.8	495	1,162	(57.4)
Balers (Bales under 200 lbs)	329	353	(6.8)	858	1,029	(16.6)
Forage Harvesters (Shear Bar Type)	126	92	37.0	351	270	30.0
Mower Conditioners	758	680	11.5	1,859	1,988	(6.5)

Canadian sales forecast upbeat

Members of the Canadian Farm & Industrial Equipment Institute issued a more optimistic outlook report at the group's annual conference in Edmonton recently.

Total tractor sales had been predicted at 17,344 units for 1987 in January. By June, the estimate was for sales of 18,931 units.

However, an observer pointed out that the revised estimates were cast before the Canadian Wheat Board set a lower price on wheat.

Actual retail sales in the first four months of 1987 were down in most categories, according to CFIEI.

Sales of all tractors were off 11 percent at 4,739 units, with improved sales of under-40-hp units up 8.7 percent at 1,255 and 40-99-hp models up 7.8 percent to 2,603 units offsetting severe declines of over-100-hp tractors (down 54 percent at 578) and four-wheel-drive versions (down 42 percent at 303).

Sales of combines in the January-April period were down by nearly half from the same 1986 period.

However, mower-conditioners and round balers showed improvement.

Purdue project 'Breaking New Ground'

Sometimes, farm machines are modified so that disabled farmers can use them. *Breaking New Ground*, the project at Purdue University's Department of Agricultural Engineering to help disabled farmers, is publishing a manual which describes and evaluates 27 modified, self-propelled machines.

It's an effort to offer possible solutions to other disabled farmers, or those involved in modifying their equipment.

Contact Bill Field, Department of Agricultural Engineering, Purdue University, West Lafayette, Ind. 47907.

Allied reports sales up in first quarter

Allied Products Corp., Chicago, Ill., whose subsidiaries include White Farm Equipment, New Idea, Bush Hog, Lilliston and Kewanee, has reported sales of $127 million and earnings of $4.9 million in the first period of 1987, compared with sales of $84 million and net income of $3.6 million a year earlier.

The company said it began implementing a plan in the first quarter to restructure and consolidate certain operations in its Agricultural Equipment Group.

Bob Green returns as Case sales VP

Robert L. Green has been named to the new position of vice president, sales, North America, for J I Case Co. He is responsible for the five Case IH group sales offices and the sales managers of Steiger Tractor and Poclain.

Green was with J I Case from 1972 to 1984 and was vice president of agricultural marketing, North America, when he left to be president of Fiat-Allis in 1984. He had been president of McRand, Inc., from 1985 until rejoining Case.

He reports to John F. Gleason, senior vice president of sales and marketing for North America.

Varity Corp. sales up, but loss is posted

Varity Corp. (formerly Massey-Ferguson) had sales in the fiscal year ending Jan. 31 of $1.36 billion, compared with the prior year's volume of $1.29 billion, but the previous year's profit of $4 million turned into a loss of $23 million, almost all from continuing operations.

Sales in the United States were down slightly from $229 million to $214 million, while Canadian volume rose from $60 million to $69 million. Volume was up in main European markets by about $54 million to $690 million. The biggest area of sales loss was Australia, which dropped from $54 million to $35 million.

Case IH sales hit $3.36 billion in '86

J I Case (Case IH) had 1986 net sales of $3.358 billion, according to the annual report of its parent company, Tenneco. The previous year, when Case had just acquired International Harvester Agricultural Equipment Group, produced sales of $2.697 billion.

Case had a 1986 loss of $4 million from continuing operations, but Case's equity in the net income of affiliated companies added earnings of $3 million, reducing the net loss before taxes and interest to $1.1 million.

INVENTORY WATCH

WHAT'S HAPPENING TO STOCKPILES IN RELATION TO SALES.

Equipment	Inventory Levels Feb. 28 1986	Sept. 30, 1986	Oct. 31, 1986	Nov. 30, 1986	Dec. 31, 1986	Jan. 31, 1987	Feb. 28, 1987	12-Month Sales, Mar. 1, 1986 Feb. 28, 1987
Tractors								
Under 40 hp	56,446	57,108	57,880	59,141	61,842	65,955	68,768	61,450
40-99 hp	25,929	24,915	24,774	23,560	23,520	22,623	22,830	29,968
100 hp and over	20,918	16,299	14,901	14,228	13,805	12,549	12,500	12,649
Four-wheel drive	2,623	2,247	2,092	1,956	1,660	1,541	1,530	1,845
Total Tractors	**105,916**	**100,569**	**98,647**	**103,684**	**101,427**	**102,668**	**105,628**	**105,912**
S-P Combines	6,342	5,624	4,580	4,094	4,271	4,267	4,678	7,051

Source: Farm & Industrial Equipment Institute

Dealers *(from page 10)*

"We haven't been pushed to buy some excessive number of saws or parts," he remarks. "I also like the interinterchangeable parts and the sale price, which is something you can live with, make some money and keep the customer happy. We're not asked to go beyond what our normal market can absorb."

Bill Robertson is a Case IH dealer at Winona, Miss., and his dealership, Robertson Farm Equipment, only started selling Pioneer/Partner chain saws last October, but he's been making things happen. When *I&T* talked to him at the end of April, he reported 66 units sold since then, plus a lot of bar, oil, chain and other parts.

"Right now," he says, "pulpwooders are our heaviest market, but we have homeowner business, too. Our serviceman who has done small engine work on lawn and garden equipment is taking care of servicing the saws."

He adds: "We made sure we got a supplier whose saws you won't find on the shelves at Wal-Mart."

Dave Hardy is a partner at Agri-Home Equipment, an outdoor power equipment dealership at Porterville, Calif. He reports that the business sells about 200 chain saws a year. Main lines are Sachs-Dolmar and Echo.

"About half our customers are farmers and half homeowners," he says. Of these buyers, about 90 percent take saws under the 3.8 cubic inch displacement size designated in the ANSI standard.

It's a tough game to sell saws in competition with the mass merchandisers, but Hardy says, "We aren't missing any meals. Really, service is the only thing we have to offer. We're about the only saw retailer around here that has a shop."

Hardy worked for a saw distributor for many years before opening Agri-Home 10 years ago. He's seen a lot of changes. One American manufacturer, he says, found out that the typical homeowner with a chain saw won't run it 50 hours in 10 years, "so they began making it accordingly."

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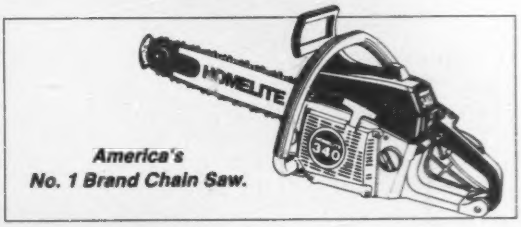

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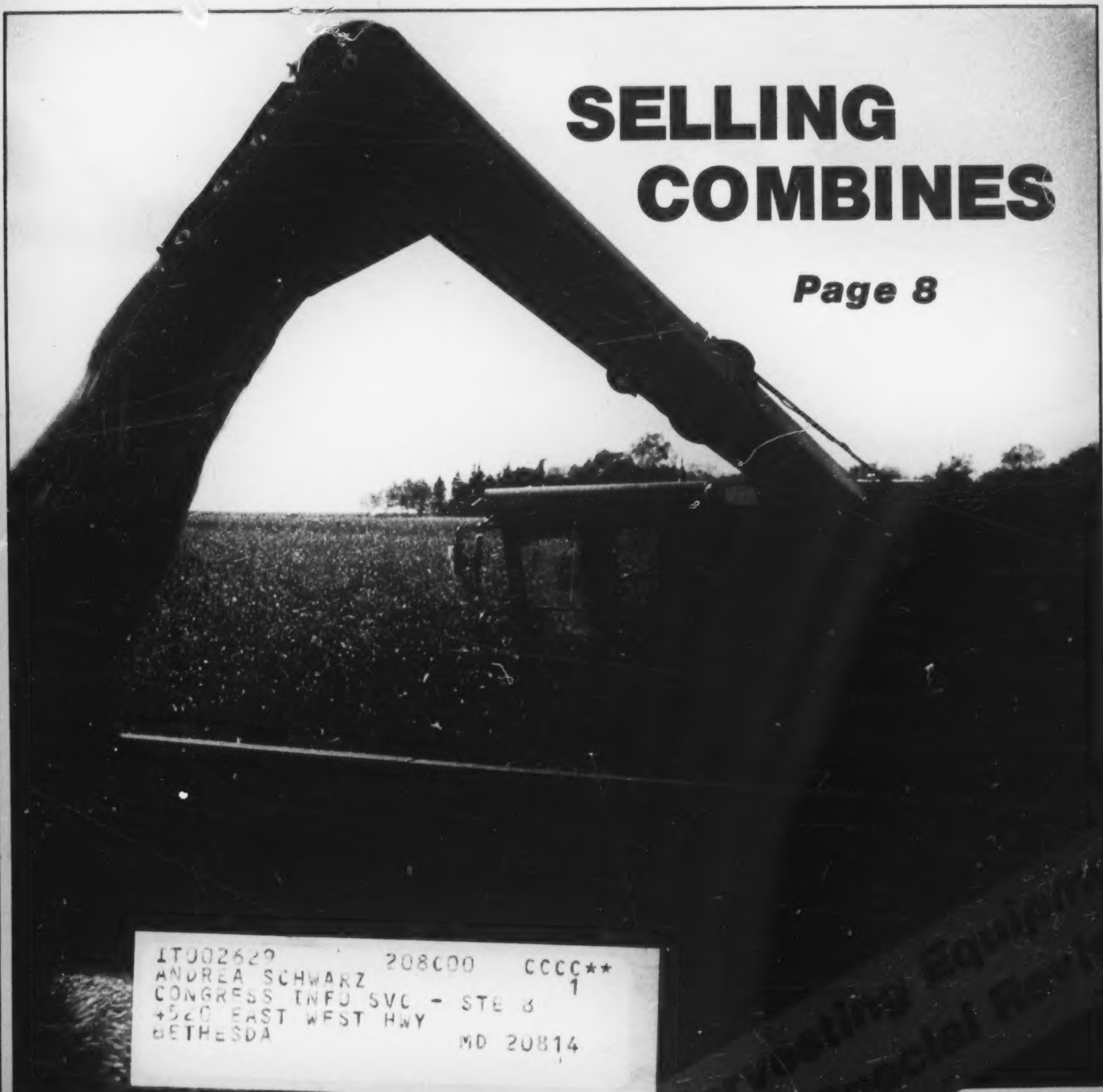
YEARS OF
LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry July 1987

Marketers Look at Show Business *Page 11*



SELLING COMBINES

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Harvesting Equipment
Special Report

IT002629 208000 CCCC**
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I&T 100 YEARS OF LEADERSHIP

Implement &Tractor

The business magazine of the farm and industrial equipment industry.

July 1987 • Vol. 102 • No. 8

Our Cover Story

If we can't expect a return to the good old days of 30,000 combine sales, it's still possible to sell equipment that improves the whole harvesting system.

Page 8

Features

8: I&T takes a look at some of the new equipment — including combines — available for harvesting grain.

11: With the recent increase in equipment shows and the downturn in the industry, manufacturers have become selective about their participation. Several manufacturers told I&T what they consider in deciding which shows to attend.

15: Details about industry conventions, meetings and machinery shows in the coming year.

26: SIMA—the International Agricultural Machinery Exposition in Paris — is the world's largest event of its kind. Despite hard times in the industry, SIMA continues to thrive.

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Farm Press
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May Sales: Big Tractors Down, Hay Tools Up

After several months in the doldrums, U.S. retail sales of farm tractors under 100 hp picked up in May, according to the flash report of the Farm & Industrial Equipment Institute. Sales of small-bale balers, forage harvesters and mower conditioners were up noticeably.

	Unit Retail Sales					
	May			January-May		
Equipment	1987	1986	%	1987	1986	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	7,291	7,081	3.0	25,544	26,724	(4.4)
40 & Under 100 HP	2,708	2,616	3.5	11,435	12,188	(6.2)
100 & Under 140 HP	261	491	(46.8)	1,316	2,296	(42.7)
140 HP & Over	523	1,067	(51.0)	2,453	4,530	(45.8)
Total 2-Wheel Drive	10,783	11,255	(4.2)	40,748	45,738	(10.9)
4-Wheel Drive						
Under 200 HP	28	39	(28.2)	219	244	(10.2)
200 HP & Over	54	67	(19.4)	346	527	(34.3)
Total 4-Wheel Drive	82	106	(22.6)	565	771	(26.7)
Total Farm Wheel Tractors	10,865	11,361	(4.4)	41,313	46,509	(11.2)
Combines (Self-Propelled)	110	139	(20.9)	606	1,301	(53.4)
Balers (Bales under 200 lbs.)	462	377	22.5	1,325	1,406	(5.8)
Forage Harvesters (Shear Bar Type)	145	89	62.9	496	359	38.2
Mower Conditioners	1,340	788	70.1	3,196	2,776	15.1

FIEI Updates Forecast: Lower '87 Volume Seen

The Farm & Industrial Equipment Institute has issued an update of its January retail sales forecast for 1987. The forecast takes the predictions of participating members in terms of percentage of change, up or down, and presents the median estimate.

Retail dollar volume, expected to be up 2 percent in January, is now expected to be the same as last year.

Tractor unit sales are now expected to decline about 1 percent. The earlier forecast was for a 2 percent rise. Units of under-40 hp, expected to go up 2 percent in January, are now seen up by less than 1 percent. Tractors in the 40-99 hp bracket were expected to go up about 5 percent and are now seen as declining about 1 percent. Tractors of 100 hp and more were seen as declining close to 5 percent earlier and are now expected to be down about 5.5 percent. Four-wheelers are expected to take the big hit: Down 3.5 percent in January, now down 12 percent.

Combines and corn heads were predicted as declining 16 percent earlier. It's not so bad now at 12.5 percent.

In January, windrowers, mower-conditioners and conventional balers were expected to hold steady for 1987; now the marketers expect windrowers to go down 1 percent, mower-conditioners to go up about 3 percent and conventionals to dip 2 percent.

But big balers, seen as up 2.7 percent in January, are now expected to improve by 3.3 percent.

Grinder-mixers were expected to jump 11 percent in January; the increase is now down to 2 percent. Manure spreaders: Down 5.5 percent in January, down a little less in May to 5 percent.

Tillage equipment expectations have improved.

FIEI Forms Equipco For Liability Coverage

Member companies of the Farm & Industrial Equipment Institute have formed Equipco Insurance Co. to provide product liability insurance. The company is organized under the laws of Bermuda and is based at Hamilton, Bermuda.

Ownership and control are by the participating member companies.

Bernard Nielsen, Gehl Co., is Equipco president. Also on the board are William Barefoot, Lift-A-Loft Corp.; Dick Conway, GT, Inc.; Doublas DeKock, Harlo Products Corp.; and Lincoln Schoenberger, OEM Controls, Inc.

Deere's 2nd Period: Back in the Black

Deere & Co. has reported a net income of $35.3 million for the second quarter of fiscal 1987, ended April 30, compared with a loss of $28.9 million in the same period last year. Sales were up 12 percent to $1.14 billion.

Manufacturing and marketing operations produced a $7.5 million profit in the period; they lost $55 million in last year's second quarter. Chairman Robert Hanson said the improvement came from higher sales and production, lower costs and "improved price realization as sales incentives were reduced somewhat."

For the first six months, sales were off 6 percent to $1.622 billion and production was down 26 percent. There was a net loss of $157 million for the first half, compared with a restated loss of $55.8 million in the first half of 1986. Deere experienced a labor dispute which disrupted most production in the first quarter.

Hanson said that Deere expects farm equipment retail demand for all of 1987 to be below that of 1986 and is thus reducing production schedules somewhat. Lawn and grounds care equipment business was up in the first half. Industrial equipment sales are expected to hold even with the 1986 level.

Allied Unites White, New Idea Divisions

White Farm Equipment and New Idea Farm Equipment Division of Allied Products Corp. are now a new, combined division called White-New Idea Farm Equipment. It will be headed by Ronald W. Hottes, who had been president of New Idea.

According to Bob M. Middlebrooks, senior vice-president for Allied Products, the separate product lines and dealer organizations will be maintained. Marketing and administrative functions will be at Coldwater, Ohio, New Idea headquarters. White's headquarters in South Bend, Ind., will close, but the parts operation there will be expanded.

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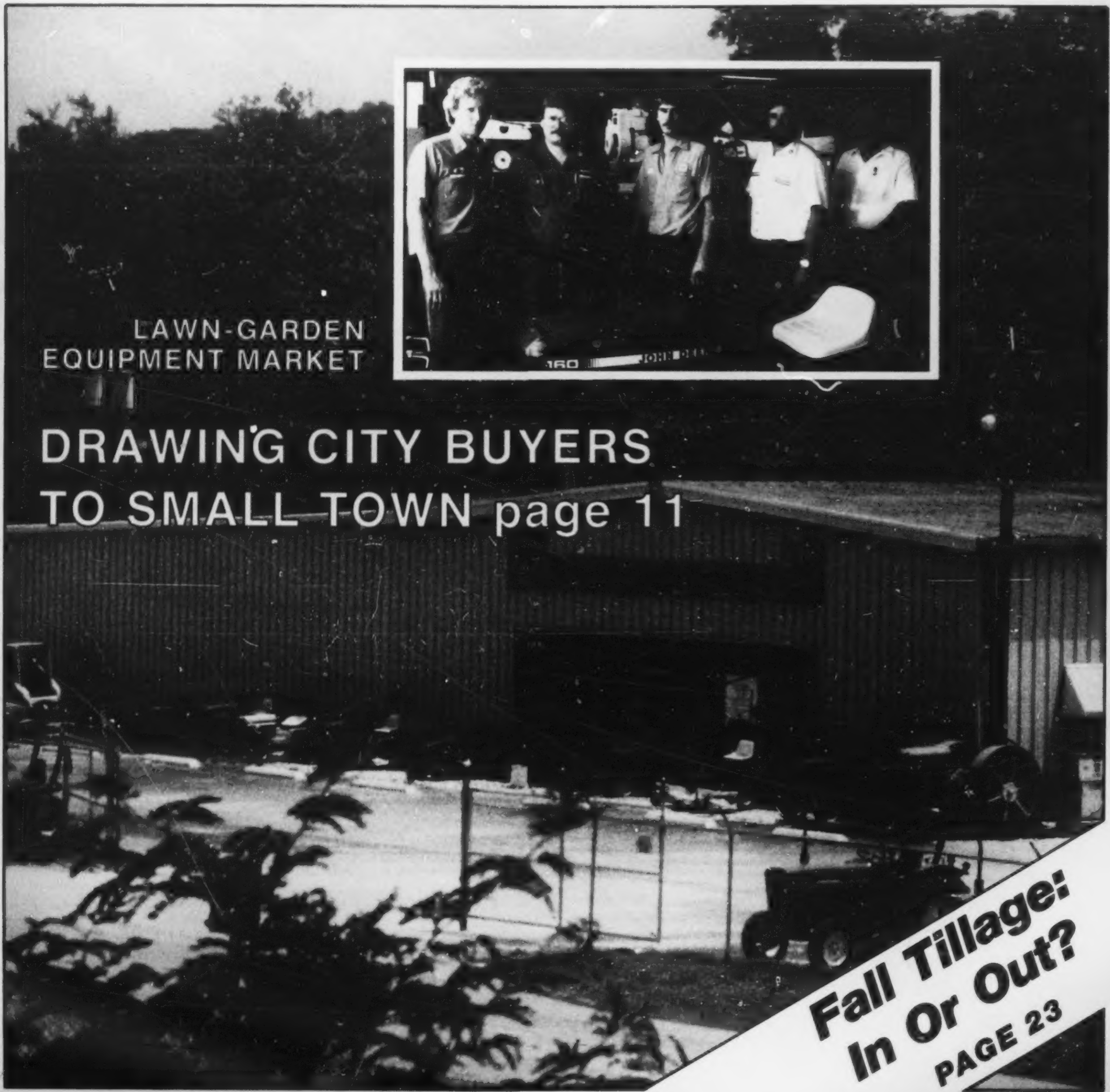
Used Equipment Market Outlook *Page 26*



LAWN-GARDEN
EQUIPMENT MARKET

DRAWING CITY BUYERS
TO SMALL TOWN page 11

Fall Tillage:
In Or Out?
PAGE 23

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

August 1987 • Vol. 102 • No. 9

Our Cover Story

At their small-town dealership, Roy Schweissguth and his sons Dave, Burt, Mike and Bob have built a strong following among homeowners in the St. Louis suburbs 40 miles to the east.

11

Features

14: **A recent study** among salesmen in agricultural and industrial dealerships in two Southeast states provides information on how management might improve incentive packages.

17: **Indispensable to** progressive dealership management is a carefully thought-out blueprint to guide decisions that affect the future.

23: **Tillage equipment** specialists say viewpoints about fall tillage and about conventional, reduced and no-till approaches are constantly changing.

26: **Dealers are moving** out a lot of used inventory as farmers remain reluctant to buy new equipment.

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Farm Press Publications, Inc.

What Matters Most to Sales People?

Florida-Georgia dealership study indicates that dollars aren't everything and that dealers may not always be in touch on this subject.

By W. David Shoup

AH, SUMMERTIME. You're taking the kids on a nice vacation trip and it's time to stop and eat.

You say to the family, "Where shall we eat?" and the overwhelming response is "McDonald's!" But in the kids' best interests (and maybe because you're sick of hamburgers), you take them to this upscale restaurant which ought to teach them to appreciate something new. So what happens?

Junior cries. Junior throws things. Junior dumps his plate all over the waiter. You try to get Junior to quiet down and five ladies at the next table size you up as a child abuser. What did you do to deserve this?

Simple. You forgot some basic rules.

Rule No. 1: You forgot to find out their needs. Junior is happy when he gets what he needs. He wasn't hungry. He just wanted the toy prize that comes in the Happy Meal.

Rule No. 2: Junior isn't you. His world looks a little different. Did you ask him what *he* wanted?

Rule No. 3: People don't always tell you *immediately* what they think. They will later. Junior waited until he had a big audience before making his point (and some salesmen will wait until the time is ripe to lay some of their feelings on you).

The difficult episode with Junior will soon pass, but when a dealer forgets the same basic rules in developing a sales compensation approach, the problems can last much longer. What happens if you forget that your salesmen have their own sets of needs, that they have different backgrounds and lifestyles? And are you sure that they'll point out the problems they have with your compensation plan at the very start? Or will they spend a lot of otherwise productive time brooding about your "harebrained scheme" before they talk to you about it?

Salesmen surveyed

A recent study among salesmen in agricultural and industrial equipment dealerships in Florida and Georgia sheds some light on how dealership management might improve incentive packages.

Is compensation-planning a problem? While only 40 percent of the managers interviewed thought there was one, nearly 65 percent of the salespeople did.

So you might say, "Big deal! Salesmen always gripe about being underpaid."

Surprise! Only three salespersons among the 70 surveyed griped about the amount of pay in dollars. These people had other things on their minds besides the total dollars in their pay envelopes.

Some managers have really struggled over this matter. One dealer had actually tried eight different sales compensation plans in 10 months. That's one approach — making changes until the right plan comes along. But the pitfalls of this are easy to imagine.

It was found that construction equipment dealers were better in tune with the desires of their sales forces than were agricultural equipment dealers. What do the construction guys do better? We don't know — yet.

What's important?

We found that there are about a dozen basic components of compensation plans that salespeople scrutinize most. And thanks to a sophisticated statistical tool called *conjoint analysis*, the relative importance of each was determined.

Salesmen ranked the *method* of payment as the single most important component of a sales compensation plan. Table I shows the ranking and psychological importance salespeople placed on each component of the compensation plan. The rankings might surprise some managers.

Within each of the compensation plan components, salesmen were offered the choice between several alternatives. These choices are explored in Table II.

For instance, salesmen were given eight choices from which to pick a payment method. The overwhelming choice of how *they* would like to be paid was to be given a salary with a commission based on the gross profit. This method was favored 2-to-1 over having a salary with commission on unit sales, which was second most popular. (Preference value was 100 to 49.7.)

Salesmen appear to consider their office surroundings the second most important component. Surprisingly, they prefer to share an office with other salesmen over having a private office. But they really hate having to share a desk!

(At this point, there may be dealers shaking their heads. "A desk? A good used desk can cost less

The author is an associate professor in the Department of Agricultural Engineering at the University of Florida, Gainesville, and president of W.D. Shoup & Associates, technical marketing and management consultants. Shoup comes from an Indiana farm equipment family and before entering the academic life was a district manager in Indiana for J I Case Co. The study of sales personnel's attitudes toward compensation plan components was conducted in cooperation with the Southern Assn., Orange Park, Fla.

than 100 bucks!" Remember, we told you that they won't tell you everything they don't like about your compensation program.)

Insurance interest

Interest in insurance coverages is definitely on the rise. If it's a matter of choice, insurance wins out over all kinds of trips to Europe, vacation, stock plans, sick leave or special privileges. Table II shows that individual coverage for 80 percent of medical expenses far outweighs HMOs, family coverage or life insurance. But it was amazing, as we took the survey, to note the interest in HMOs. They are relatively new; don't be surprised if in the near future they become a much more sought after compensation plan component.

Vacation was the fourth highest considered component. The salespersons rank a fixed number of paid days over any other methods in the survey by a large margin. The study clearly showed that there really isn't much point, incentive-wise, in offering vacation in a package unless it is paid and a fixed number of days.

It's probably important to note what didn't rate highly in some salespersons' minds. Sick leave and dealer-oriented promotional events seem to be valued low in terms of personal incentive when compared to other items. This could be in part because these items are hard to assign a personal value to. Sick

(More, next page)

When studying the tables...

1. Look at the relative values of the basic components of compensation, Table I.
2. Then, within each component, consider the relative preferences, Table II.

Table I: Relative Importance of Compensation Plan Components

Component	Relative Value
Method of payment	35
Type of office, work area	10
Insurance coverage	10
Vacation	10
Company purchase incentives	8
Training opportunities	8
Providing transportation	4
Special privileges	4
Sick leave	3
Dealer-sponsored sales-aiding events	2
Dealer pays miscellaneous business expenses	1

Table II: Sales Personnel Consider Plan Components

Component	Preference Values
A. Method of Payment	
1. Straight salary.	19.83
2. Straight commission based on unit sales.	9.20
3. Straight commission based on gross profit.	0.00
4. Straight commission based on cash difference.	15.00
5. Salary with commission on unit sales	49.70
6. Salary with commission on gross profit.	100.00
7. Salary with commission on cash difference.	42.30
8. Salary plus bonus for accomplishing management-set goals.	0.10
B. Work Area	
1. Private office.	33.88
2. Shared office.	47.10
3. Private desk.	19.99
4. Shared desk.	17.00
C. Insurance	
1. Individual 80 percent.	45.30
2. Family 50 percent.	20.35
3. HMO membership.	21.19
4. Life insurance.	31.21
D. Vacation	
1. Paid, fixed number of days.	46.90
2. Unpaid but longer period.	18.60
3. Paid, increases with seniority.	22.95
E. Opportunity to Earn	
1. Stock in dealership	42.50
2. Profit share.	19.10
3. Pension fund.	39.29
4. Contributor savings plan.	17.20
F. Training Opportunity	
1. Pay for tuition and expenses, no salary during schooling.	40.60
2. Pay for tuition and expenses, paid salary for time at school.	32.40
3. None.	15.50
G. Transportation	
1. Dealer supplies vehicle.	35.66
2. Dealer pays expenses on salesman-owned vehicle.	23.34
H. Privileges	
1. Use of company equipment.	36.52
2. Use of used equipment on lot.	30.69
3. Purchase dealer products at discount.	22.16
4. None.	28.62
I. Sick Leave	
1. Fixed number of paid days per year.	34.35
2. Flexible number of days based on need.	24.65
J. Dealer sponsors field days, demonstrations, booths at fairs, expos, home shows, etc.	
1. Yes.	33.72
2. No.	25.28
K. Dealer pays cost of salesmen-designed and/or developed:	
1. Flyers.	31.15
2. Print ads.	32.62
3. Radio spots.	24.73
L. Dealer pays miscellaneous business expenses (postage, phone, bridge tolls, etc.)	
1. Yes.	31.17
2. No.	27.83

What matters *(from previous page)*

leave plans are difficult to develop if based on an unknown income.

People changes

In the past decade, there have been many changes in the characteristics of the sales force out there. Here are just a few parting points to consider when you next work up a compensation plan for the sales staff.

1. **Salespeople** are more highly educated today. In 1965, their average education level was grade 12. Today, it is averaging just over three years of college.

2. **They are younger** as a whole today, and there is a higher percentage of single people.

3. **Their desires have changed** and so have their backgrounds. In 1965, the ag equipment salesman was typically from a farm. Today, they are both men and women, and only 35 percent of them have a farm background.

4. **They're yuppies.** They don't just want a house, a car and a place in the woods. They want VCRs, stereos, compact disk players, food processors and a Merrill Lynch account. (Even the kids who grew up milking cows want this. It's because they were educated and TV-conditioned right along with the banker's kid and the baker's kid.)

5. **Despite the decline** in agricultural backgrounds, technological backgrounds and communication skills are actually higher. Take advantage of it.

And remember as you plan the next compensation plan: Communication is two-way. Talk all you want, but don't forget to listen. ☐

Briefly...

Kenneth Austin has been succeeded as president and chief executive officer of the Minnesota-South Dakota Farm Equipment Assn. by **William L. Ryden,** effective July 1. Austin was with the association for 38 years. Ryden joined the association in 1977.

Page L. Bellinger, Deere & Co.'s manager of corporate engineering standards, has been elected a fellow of the American Society of Agricultural Engineers. The honor is given by ASAE to members for "unusual professional distinction and extraordinary qualifications."

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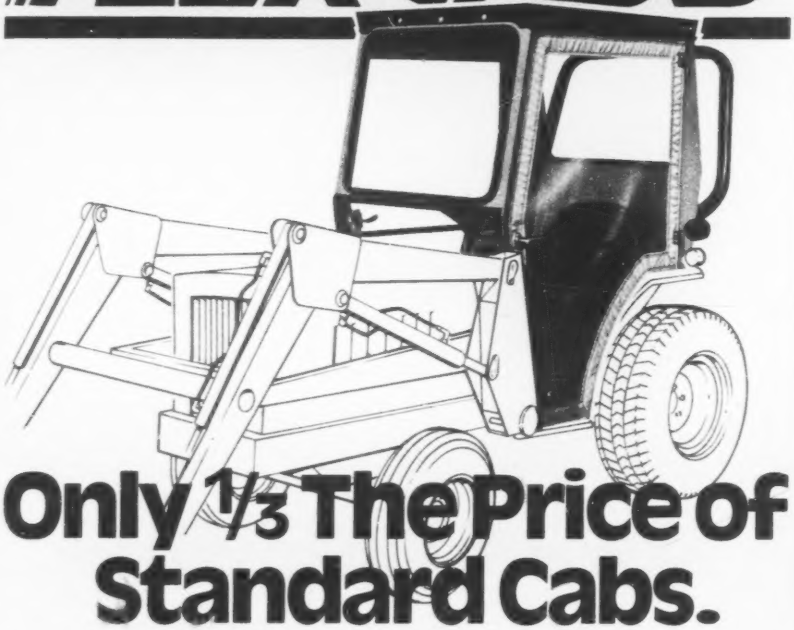

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Flex-Cab models fit:
- John Deere 655, 755 and 855 Tractors
- Kubota B6200, B7200, B8200, and B9200 Tractors
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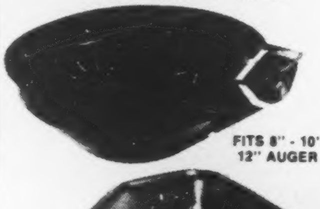

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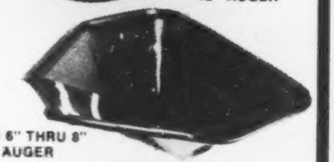

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INDUSTRY UPDATE

Hay Tool Volumes Shine

Tractor sales volume in the first half of 1987 was down 12 percent on the slow pace of 1986, according to the June flash report of the Farm & Industrial Equipment Institute. But sales of balers (bales under 200 lbs.), forage harvesters and mower-conditioners were up notably.

	Unit Retail Sales					
	June			January-June		
Equipment	1987	1986	Pct. Change	1987	1986	Pct. Change
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	8,359	8,875	(5.8)	33,946	35,599	(4.6)
40 & Under 100 HP	3,768	4,014	(6.1)	15,165	16,202	(6.4)
100 & Under 140 HP	323	944	(65.8)	1,643	3,240	(49.3)
140 HP & Over	547	1,515	(63.9)	2,991	6,045	(50.5)
Total 2-Wheel Drive	**12,997**	**15,348**	**(15.3)**	**53,745**	**61,086**	**(12.0)**
4-Wheel Drive						
Under 200 HP	54	41	31.7	273	285	(4.2)
200 HP & Over	76	137	(44.5)	421	664	(36.6)
Total 4-Wheel Drive	**130**	**178**	**(27.0)**	**694**	**949**	**(26.9)**
Total Farm Wheel Tractors	13,127	15,526	(15.5)	54,439	62,035	(12.2)
Combines (Self-Propelled)	391	464	(15.7)	997	1,765	(43.5)
Balers (Bales under 200 lbs)	1,400	1,198	16.9	2,725	2,604	4.6
Forage Harvesters (Shear Bar Type)	390	283	37.8	886	642	38.0
Mower Conditioners	3,289	2,724	20.7	6,484	5,500	17.9

Canadians Optimistic Despite Sales Decline

Despite a downward trend in 1987 tractor sales through May, manufacturers are anticipating a modest increase in total unit sales for 1987 over 1986 — 18,931 compared with 18,749 — according to the Canadian Farm & Industrial Equipment Institute.

Through May, unit sales of farm tractors were down 11.6 percent from 7,087 to 6,262. Sales of two-wheel-drive models under 100 horsepower were up over 5 percent to 5,153 units.

Imports Outpaced Exports

Farm equipment imports in the first three months of 1987 were even with the import level of the same 1986 period, $448.8 million, according to the U.S. Commerce Department Office of Capital Goods and International Construction. Exports, meanwhile, declined over 15 percent to $343.8 million.

In 1986, imports exceeded exports for the first time, leaving the U.S. farm equipment industry with an unfavorable trade balance of $164 million.

Main reason for the decline through the 1980s from a favorable balance of almost $1.4 billion in 1981 has been the shifting of substantial amounts of production by major American manufacturers to their subsidiaries in Western Europe.

Principal sources of imports: Japan, up 1 percent to $132 million; Canada, up 43 percent to $109 million; West Germany, down 31 percent to $54 million; Britain, down 13 percent to $54 million; Italy, down 4 percent to $29 million; France, down 20 percent to $19 million.

Tractor imports, excluding a grouping dominated by garden tractors, came to 31,784 units valued at $185 million.

INVENTORY WATCH

WHAT'S HAPPENING TO STOCKPILES IN RELATION TO SALES.

	Inventory Levels							12-Month Sales,
Equipment	**April 30, 1986**	**Nov. 30, 1986**	**Dec. 31, 1986**	**Jan. 31, 1987**	**Feb. 28, 1987**	**Mar. 31 1987**	**April 30, 1987**	**May 1, 1986 April 30, 1987**
Tractors								
Under 40 hp	55,947	59,141	61,842	65,955	68,768	70,311	70,672	60,258
40-99 hp	27,457	23,560	23,520	22,623	22,830	22,949	22,706	30,003
100 hp and over	19,510	14,228	13,805	12,549	12,500	12,561	12,203	11,979
Four-wheel drive	2,537	1,956	1,660	1,541	1,530	1,592	1,494	1,855
Total Tractors	**105,451**	**103,684**	**101,427**	**102,668**	**105,628**	**107,413**	**107,075**	**104,095**
S-P Combines	7,054	4,094	4,271	4,268	4,678	4,994	5,186	6,994

Source: Farm & Industrial Equipment Institute

C3450-1
9/23/87

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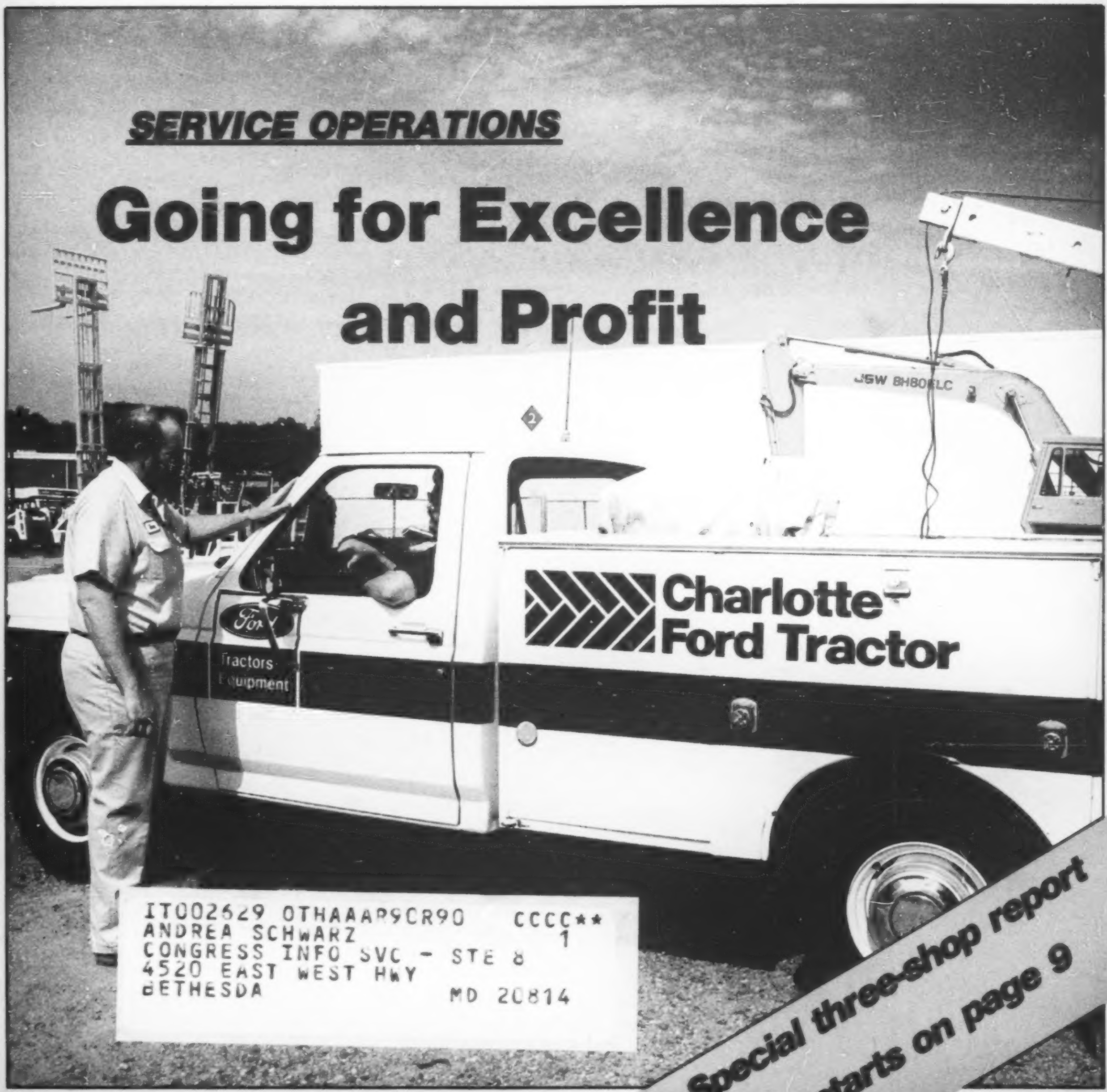
YEARS OF
LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry September 1987

Boom-Mounted Reach Mowers

page 20



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I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry.

September 1987 • Vol. 102 • No. 10

Our Cover Story

At Charlotte Ford Tractor, service manager Tommy Crowell talks over an upcoming field call with one of the dealership's well-trained technicians.

11

Charlotte Ford Tractor

Features

9: **The beginning point** for a profitable shop is a sound service philosophy. The margin for error has narrowed in recent years, says dealer Lee Rogness.

15: **This high volume** operation in the Dakotas has built service into a highly profitable enterprise.

18: **Nebraska Tractor Tests** have been an American standard since 1919. What's happening to that status now?

20: **Reach mowers** are hot items in the U.S. as government agencies and other off-road markets have realized the versatility of the boom-type mowers.

27: **Farmer Ernest Chesney** was a Deere dealer in the past. He has some advice for both farmers and dealers that could make business more profitable for both.

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Farm Press Publications, Inc.

Tractor Sales Took Big July Jump

Sales of two-wheel-drive tractors showed strong increases in July, according to the Farm & Industrial Equipment Institute's July flash report. Was it a matter of strong market upturn or just the return of heavy discounting? Some market observers say both forces were at work.

According to market observers, improved sales of tractors under 100 hp are a sign of real market demand. Used tractors in the 40-hp to 100-hp group have been selling very well at strong prices since early spring, and the demand is beginning to move into new tractor markets.

The leap in big tractor sales is said to be largely a matter of major manufacturers returning to the big discount practices of 1986 and earlier. Such cuts had largely disappeared by the first of 1987, and sales since then had been very sluggish.

One marketing executive told *I&T*: "We think everyone's going to have two or three goes at cutting out the discounts before it finally sticks."

Unit Retail Sales

Equipment	July 1987	July 1986	%	January-July 1987	January-July 1986	%
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 HP	5,446	4,846	12.4	39,462	40,445	(2.4)
40 & Under 100 HP	2,836	2,339	21.2	17,913	18,541	(3.4)
100 & Under 140 HP	293	163	79.8	1,941	3,403	(43.0)
140 HP & Over	713	286	149.3	3,702	6,331	(41.5)
Total 2-Wheel Drive	9,288	7,634	21.7	63,018	68,720	(8.3)
4-Wheel Drive						
Under 200 HP	21	59	(64.4)	282	344	(18.0)
200 HP & Over	69	123	(43.9)	490	787	(37.7)
Total 4-Wheel Drive	90	182	(50.5)	772	1,131	(31.7)
Total Farm Wheel Tractors	9,378	7,816	20.0	63,790	69,851	(8.7)
Combines (Self-Propelled)	749	774	(3.2)	1,747	2,539	(31.2)
Balers (Bales under 200 lbs)	958	1,117	(14.2)	3,702	3,721	(.5)
Forage Harvesters (Shear Bar Type)	199	262	(24.0)	1,096	904	21.2
Mower Conditioners	1,487	1,640	(9.3)	7,973	7,140	11.7

These data are, in part, estimates which are subject to revisions when final detail data become available. Because of the seasonal nature of the industry, comparisons of monthly data from one period to another should be done with extreme caution. These data represent most, but not all of the manufacturers in each product category being sold at retail in the 50 states and the District of Columbia.

Beware of Mismatched Implement Rims, Tires

Some tire dealers have mistakenly tried applying domestic implement tires to certain European wheels with unique diameter and width, according to Armstrong Tire Co.

According to Fred Fuest, Armstrong's consumer affairs manager, attempts to mount domestically produced tires on these wheels may cause the tire beads to break, possibly resulting in serious injury or death.

"The rims in question," he said, "are 15.3 inches in diameter and nine inches wide. Rims manufactured in 1981 and earlier are marked 15 inches but they are actually 15.3 inches. Later wheels are marked 15.3 inches. If one runs across a nine-inch rim, he should not try to use a 15-inch tire with it. The domestic industry does not manufacture a nine-inch rim width for farm implements."

European tire sizes that may be mounted on these rims are: 10.0/75-15.3; 10.5/80-15.3; 11.5/80-15.3; and 12.5/80-15.3.

For more information, contact Armstrong's consumer/dealer affairs department at 800-243-0167.

FIEI Plans Light Construction Unit Show

Demo Expo '88 will be a trade show for manufacturers and users of light and medium-sized construction equipment. It is slated for September 1988 at the Kentucky Fair & Exposition Center, Louisville, Ky., under the sponsorship of the Industrial & Construction Equipment Division of FIEI.

Case, Hesston Plan Joint Venture

J I Case Co. and Hesston Corp. have agreed in principle to form a joint venture to make hay and forage equipment at the Hesston facilities in Hesston, Kan. Ownership will be equal.

Subject to completion of documents by both firms, the resulting partnership is expected to begin operations in the fourth quarter of 1987.

The $40 million venture will consist primarily of the existing manufacturing facility and related equipment and offices of Hesston. Case IH and Hesston will each sell equipment manufactured by the joint venture under their own brand names.

Hesston Corp. currently has about 875 employees. If the joint venture is established, about 785 of the employees would become workers for the new entity. The remaining Hesston Corp. would be essentially a marketing organization. There has been no name announced for the planned venture.

Several years ago, International Harvester Co. sold most of its hay tool line to New Idea, now a subsidiary of Allied Products and in the process of becoming merged with White Farm Equipment, another Allied subsidiary. Since then, New Idea has supplied most of IH's and then Case IH's hay tool needs.

A Case IH spokesman told *I&T* that the company intends to maintain a business relationship with New Idea and has presented a proposal to that company.

Deere Names Stowe Senior Ag V.P.

David H. Stowe Jr. is new senior vice president for Deere & Co.'s worldwide agricultural equipment and consumer products division. Hans W. Becherer, who was named Deere's president and chief operating officer in February, had previously held the position.

Stowe had been senior vice-president, worldwide industrial equipment operations. Thomas A. Gildehaus, executive vice-president, has assumed those duties.

C3450-1
10/26/87

I&T 100 YEARS OF LEADERSHIP

Implement & Tractor

The business magazine of the farm and industrial equipment industry October 1987

Grounds Maintenance Market ***page 23***

Oth Market Statistics Issue

Export-Import Data
Equipment on Farms, July
Retail Sales by State

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'We've Changed Our Stocking Guidelines' ***page 25***

I&T 100 YEARS OF LEADERSHIP

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The business magazine of the farm and industrial equipment industry.

October 1987 • Vol. 102 • No. 11

Our Cover Story

Implement & Tractor presents its 50th Market Statistics Issue—equipment inventories by state and type of product; retail sales by state; and import and export figures.

7-19

On the cover: photo from Ford New Holland

Features

20: **Discouraging statistics** couldn't overshadow the good ideas exhibited at the 1987 Royal Show in Britain. Michael Williams reports and gives us a look at some of those ideas.

23: **Outdoor power** equipment kept the doors of many dealerships open during recent years. Forecasts are that good opportunities for consumer and commercial sales will continue.

25: **Having designated** the parts department as the profit center of his dealership, Texan Jerry James is making changes designed to improve the fill rate and inventory turns.

27: **Ernest Chesney,** a north central Texas farmer and former implement dealer, advises those on both sides of the counter to improve their relationship as partners in agriculture.

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Farm Press Publications, Inc.

Motor Vehicles and Specified Machines on U.S. Farms and Average Prices of Wheel Tractors, January 1, Designated Years[1]

YEAR	TRACTORS (exclusive of steam & garden)[2] Thousands	MOTOR TRUCKS Thousands	GRAIN COMBINES Thousands	CORN PICKERS and PICKER SHELLERS Thousands	PICK-UP BALERS Thousands	FIELD FORAGE HARVESTERS Thousands	GARDEN TRACTORS and MOTOR TILLERS[3] Thousands	WHEEL TRACTORS WHOLESALE PRICES[4] Per Unit Dollars	Horsepower Dollars
1964	4,786	2,970	920	705	734	312	513	$ 3,443	$ 53
1965	4,787	3,030	910	690	751	316	699	$ 3,541	$ 56
1966	4,783	3,017	888	686	752	316	725	$ 3,886	$ 58
1967	4,786	3,009	867	680	748	319	750	$ 4,257	$ 62
1968	4,766	3,016	847	673	739	321	770	$ 4,709	$ 66
1969	4,712	3,004	820	657	725	314	790	$ 4,976	$ 71
1970	4,619	2,978	790	635	708	304	805	$ 5,560	$ 76
1971	4,562	2,985	760	629	698	309	815	$ 6,190	$ 80
1972	4,509	2,993	725	625	687	315	825	$ 6,486	$ 84
1973	4,477	3,006	703	618	680	324	835	$ 6,953	$ 85
1974	4,478	3,020	685	618	677	332	850	$ 7,294	$ 86
1975	4,463	3,032	666	615	666	337	870	$ 8,459	$ 91
1976	4,434	3,043	647	610	642	342	890	$11,220	$112
1977	4,381	3,052	630	605	614	346	905	$12,692	$124
1978	4,350	3,054	615	600	595	345	917	$13,431	$144
1979	4,623	3,350	655	596	744	295	927	$16,512	$149
1980	4,598	3,367	653	592	759	293	933	$18,139	$166
1981	4,573	3,385	650	587	774	291	938	$23,308	$199
1982	4,547	3,405	647	582	788	288	942	$25,941	$204
1983	4,520	3,427	644	576	799	285	944	$34,198	$237
1984	4,497	3,449	642	569	810	282	945	$37,434	$261
1985	4,480	3,467	640	561	822	280	942	$40,730	$290
1986	4,465	3,460	637	552	819	278	938	—	—
1987	4,443	3,446	632	540	812	273	933	—	—

[1] SOURCE: Reports of the USDA and the Bureau of the Census. On-farm data after 1970, except 1975 and 1979, are estimated by I&T.

[2] Consists of Wheel and Crawler Tractors.

[3] Motor Tillers included after 1964.

[4] Estimated at wholesale level by dividing **Value of Manufacturers' Shipments by Units Shipped** and by **Maximum Belt Horsepower**, data are published in "Current Industrial Reports" of the Bureau of the Census. Not available after 1985.

Note: Data from the 1978 Census (Jan. 1, 1979 above) and later years, reflect changes in sample coverage and are not fully comparable with earlier years.

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Principal Machines on Farms — 1987

STATE	MOTOR TRUCKS			INTERNAL COMBUSTION ENGINES[1]	CHAIN SAWS
	1978 Census Thousands	1982 Census Thousands	Estimated July 1, 1987 Thousands	Estimated July 1, 1987 Number	Estimated July 1, 1987 Number
Maine	12.3	12.2	12.0	1,355	7,245
New Hampshire	3.8	4.1	4.2	1,270	2,390
Vermont	6.6	7.5	7.9	1,775	6,015
Massachusetts	9.0	9.4	9.5	1,830	4,385
Rhode Island	1.3	1.3	1.3	190	615
Connecticut	6.6	6.8	6.7	1,610	3,680
New York	57.6	60.5	61.7	21,370	48,580
New Jersey	14.4	15.2	15.5	2,355	5,785
Pennsylvania	63.8	66.1	66.7	20,380	42,575
Delaware	6.2	6.2	6.1	945	2,450
Maryland	22.8	25.9	27.3	4,595	11,860
NORTHEAST	**204.4**	**215.2**	**218.9**	**57,675**	**135,580**
Ohio	107.1	107.8	107.3	19,450	59,000
Indiana	114.4	112.2	111.0	20,115	63,105
Illinois	150.6	150.6	148.9	29,945	68,625
Iowa	144.0	147.7	147.9	31,885	54,580
Missouri	155.9	159.7	161.2	32,990	91,400
CORN BELT	**672.0**	**678.0**	**676.3**	**134,385**	**336,710**
Michigan	77.4	80.3	81.2	18,105	44,160
Wisconsin	98.0	99.5	99.1	34,705	89,605
Minnesota	144.1	143.8	141.9	47,100	64,070
LAKE STATES	**319.5**	**323.6**	**322.2**	**99,910**	**197,835**
North Dakota	107.7	101.1	96.2	35,490	4,140
South Dakota	66.0	68.0	68.3	23,645	3,195
Nebraska	118.6	118.9	117.9	32,225	13,625
Kansas	160.8	159.4	156.7	41,490	22,480
GREAT PLAINS	**453.1**	**447.4**	**439.1**	**132,850**	**43,440**
West Virginia	19.2	20.5	20.9	5,050	21,040
Kentucky	119.3	125.2	127.8	16,210	43,165
Tennessee	96.4	104.7	108.7	12,490	57,260
Virginia	62.6	68.0	69.9	12,110	46,840
North Carolina	106.2	103.3	100.3	15,730	84,355
APPALACHIAN	**403.7**	**421.7**	**427.6**	**61,590**	**252,660**
South Carolina	36.1	34.6	33.3	6,200	23,815
Georgia	74.3	72.6	70.9	12,775	32,850
Florida	49.4	51.2	51.6	12,205	7,530
Alabama	68.6	67.4	66.1	10,390	31,025
SOUTHEAST	**228.4**	**225.8**	**221.9**	**41,570**	**95,220**
Mississippi	58.0	59.0	58.9	10,010	36,620
Louisiana	44.9	44.3	43.8	11,915	20,095
Arkansas	80.7	79.3	77.6	13,540	30,865
DELTA STATES	**183.6**	**182.6**	**180.3**	**35,465**	**87,580**
Oklahoma	118.3	122.8	125.1	20,210	9,955
Texas	239.0	249.9	263.8	60,350	19,450
SOUTHERN PLAINS	**357.3**	**372.7**	**388.9**	**80,560**	**29,405**
Montana	67.2	68.2	68.1	18,400	11,850
Idaho	56.7	57.1	56.5	15,065	13,130
Wyoming	20.0	22.1	23.1	5,960	3,215
Colorado	63.4	63.0	62.1	19,355	6,080
New Mexico	23.9	24.6	24.8	7,245	3,015
Arizona	15.3	16.6	17.1	4,960	515
Utah	21.7	23.3	24.0	6,290	2,380
Nevada	6.0	6.5	6.6	1,475	605
MOUNTAIN STATES	**274.2**	**281.4**	**282.3**	**78,750**	**40,790**
Washington	64.7	69.2	70.4	15,730	22,825
Oregon	54.4	61.2	58.6	20,405	25,900
California	134.6	147.9	153.5	61,110	32,055
PACIFIC	**253.7**	**278.3**	**282.5**	**97,245**	**80,780**
TOTAL	**3,349.9**	**3,426.7**	**3,440.0**	**820,000**	**1,300,000**

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[1] Includes engines used for stationary work such as irrigation, auxilliary engines on combines, balers, etc., and a small number of power units not elsewhere classified.

Notebook *(from pg. 6)*

facturers who have achieved a truly monumental acceptance and substitution of chemical expense on the farm for machinery investment, and the expenses incident to effective tillage and crop rotation."

Today, with the Ohio State study confirming what his judgment and that of others had indicated, he says:

"Look, we are here to help farmers with their crop production problems. We have a mechanical solution to that problem that I'm trying to sell. There are chemical solutions to farmers' problems, too, and they're pushing theirs as hard as they can."

But, here we are, sitting tight and selling that combine with the tremendously improved life expectancy at a low-profit or no-profit price. The idea of justifying the purchase of it on a basis of what it will return in profit for the customer is largely ignored. "We have a tremendous deal for the farmer," notes Koenig, "But we don't really believe it ourselves and so we discount the price."

If anyone is interested in the ASAE paper which the Ohio dealers funded, it's "Updated Variable Costs of Farm Machinery Operation in Ohio" (ASAE 86-1027) by Joe A. Gliem and others in the Ohio State University ag engineering department. ASAE is at 2950 Niles Rd., St. Joseph, Mich. 49085-9659. I assure you it's short and to the point.

It ought to be a little embarrassing to the industry that it was left to a state dealer association with modest resources to fund this piece of work. A lot more needs to be done.

It seems strange that so few people in the machinery industry want to take the view that they must compete with the chemical industry for farmer dollars. Maybe they'll admit that this is the reality of the situation, but few apparently feel ready to go to the mat against those chemical heavyweights in the marketplace.

But if the data can be mustered to show farmers that in many cases they can ultimately profit more by very selectively putting more bucks into equipment and less into chemicals, it ought to produce more deals for dealers and manufacturers, and more profit for farmers.

And it also might give this industry the gumption to stick with a fair price rather than stampeding into repeats of *The Big Discount* when farmers need to be shown that the price is justified.

Scanning the Stats: I&T's 50th Special

This is our 50th Market Statistics Issue. Take a walk through the tables

(See Notebook, pg. 14)

Principal Machines on Farms — 1987

STATE	WHEEL TRACTORS			SELF-PROPELLED COMBINES			CORN HEADS		
	1978 Census Number	1982 Census Number	Estimated July 1, 1987 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1987 Number	1978 Census Number	1982 Census Number	Estimate July 1, 1987 Number
Maine	13,741	13,569	13,330	388	320	275	183	181	175
New Hampshire	4,877	5,097	5,165	14	8	4	64	50	40
Vermont	14,637	15,274	15,435	156	76	62	346	374	370
Massachusetts	9,840	9,956	9,910	26	23	19	113	145	150
Rhode Island	1,462	1,364	1,285	13	6	4	17	13	10
Connecticut	7,865	8,421	8,605	86	53	41	157	98	70
New York	120,215	119,498	118,065	5,775	6,030	6,060	3,401	3,904	4,010
New Jersey	20,655	20,554	20,320	1,086	1,011	940	532	593	590
Pennsylvania	137,998	136,505	134,505	9,674	9,707	9,570	4,409	5,408	5,690
Delaware	8,348	8,012	7,780	1,314	1,342	1,340	1,003	1,006	970
Maryland	36,251	36,951	36,945	3,518	3,279	3,105	2,732	2,840	2,795
NORTHEAST	**375,889**	**375,201**	**371,345**	**22,050**	**21,855**	**21,420**	**12,957**	**14,612**	**14,870**
Ohio	198,865	193,367	188,740	33,449	33,200	32,570	24,438	26,403	26,475
Indiana	176,767	167,563	161,130	37,403	34,646	32,725	32,638	31,391	29,860
Illinois	277,604	262,112	254,765	63,230	61,411	59,680	55,793	55,636	53,680
Iowa	323,132	305,334	294,440	55,586	57,726	58,390	53,030	57,046	57,050
Missouri	198,225	193,758	190,135	33,378	32,957	32,240	23,056	21,834	20,435
CORN BELT	**1,174,593**	**1,122,134**	**1,089,210**	**223,045**	**219,940**	**215,605**	**188,955**	**192,310**	**187,500**
Michigan	148,063	146,655	144,825	18,919	21,060	21,490	11,076	13,583	14,480
Wisconsin	252,594	243,827	237,605	18,262	19,215	19,415	8,458	11,939	13,425
Minnesota	277,920	264,581	256,150	44,841	45,847	45,830	27,197	31,098	37,070
LAKE STATES	**678,577**	**655,063**	**638,580**	**82,022**	**86,122**	**86,735**	**46,731**	**56,620**	**59,975**
North Dakota	120,191	108,103	102,100	30,782	27,546	26,110	1,619	2,708	3,090
South Dakota	111,485	105,699	100,765	16,503	16,961	16,955	7,759	9,606	10,430
Nebraska	175,569	164,308	159,105	35,083	34,032	33,035	24,623	25,484	25,535
Kansas	157,327	149,870	145,305	47,142	46,662	45,745	9,150	8,321	7,345
GREAT PLAINS	**564,572**	**527,980**	**507,275**	**129,510**	**125,201**	**121,845**	**43,151**	**48,119**	**46,400**
West Virginia	24,901	27,110	27,820	479	562	615	265	471	500
Kentucky	157,432	163,176	163,620	10,568	11,466	11,805	8,382	9,924	10,370
Tennessee	120,161	126,365	129,320	10,765	11,227	11,310	5,581	6,508	6,765
Virginia	83,836	88,511	89,240	5,878	6,224	6,300	4,255	5,061	5,205
North Carolina	145,863	131,488	126,030	13,297	13,820	12,300	10,326	10,618	10,360
APPALACHIAN	**532,193**	**536,650**	**536,030**	**40,987**	**42,299**	**42,330**	**28,809**	**32,582**	**33,200**
South Carolina	47,967	44,338	41,585	6,420	6,263	6,050	3,854	3,808	3,660
Georgia	79,031	75,505	72,685	9,589	8,980	8,570	7,302	6,438	5,795
Florida	51,099	52,346	52,345	1,726	1,742	1,705	1,112	1,307	1,345
Alabama	69,438	66,330	63,910	6,660	6,935	6,995	3,383	3,630	3,615
SOUTHEAST	**247,535**	**238,519**	**230,525**	**24,395**	**23,920**	**23,320**	**15,651**	**15,183**	**14,415**
Mississippi	72,483	70,139	68,570	9,911	9,695	9,455	527	861	980
Louisiana	58,373	56,883	55,705	9,624	8,468	7,740	377	286	235
Arkansas	84,108	81,556	79,665	13,960	12,891	12,150	292	221	185
DELTA STATES	**214,964**	**208,578**	**203,940**	**33,495**	**31,054**	**29,345**	**1,196**	**1,368**	**1,400**
Oklahoma	99,771	99,934	99,210	17,647	17,299	16.855	822	600	480
Texas	262,886	264,740	264,125	23,026	21,049	19,615	3,628	3,913	3,920
SOUTHERN PLAINS	**362,657**	**364,674**	**363,335**	**40,673**	**38,348**	**36,470**	**4,450**	**4,513**	**4,400**
Montana	54,737	54,666	54,110	13,180	12,038	11,140	101	89	70
Idaho	53,552	50,575	48,755	9,843	9,309	8,870	414	344	320
Wyoming	19,322	20,673	21,090	1,999	1,991	1,955	171	221	240
Colorado	58,331	56,141	54,790	8,404	7,994	7,690	2,397	2,618	2,610
New Mexico	16,601	17,455	17,600	1,513	1,346	1,220	246	308	330
Arizona	11,956	12,262	12,265	509	369	285	60	94	95
Utah	21,145	21,613	21,585	1,743	1,591	1,460	186	225	235
Nevada	5,142	5,160	5,125	263	234	195	3	19	20
MOUNTAIN STATES	**240,786**	**238,545**	**235,320**	**37,454**	**34,872**	**32,815**	**3,578**	**3,918**	**3,920**
Washington	53,301	59,377	61,640	8,431	8,314	8,125	470	558	580
Oregon	48,158	53,243	55,310	6,335	6,235	6,080	*	209	210
California	129,480	139,735	144,490	6,270	6,102	5,910	1,016	1,123	1,130
PACIFIC	**230,939**	**252,355**	**261,440**	**21,036**	**20,651**	**20,115**	**1,486**	**1,890**	**1,920**
TOTAL	**4,622,705**	**4,519,699**	**4,437,000**	**654,667**	**644,262**	**630,000**	**346,964**	**369,115**	**368,000**

*Not reported separately.

Principal Machines on Farms — 1987

STATE	POWER ELEVATORS Estimated July 1, 1987 Number	MANURE SPREADERS Estimated July 1, 1987 Number	CORN & COTTON PLANTERS Estimated July 1, 1987 Number	GRAIN DRILLS Estimated July 1, 1987 Number	MOLDBOARD PLOWS Estimated July 1, 1987 Number	SIDE DELIVERY RAKES Estimated July 1, 1987 Number	POWER TRACTOR MOWERS* Estimated July 1, 1987 Number
Maine	4,830	2,845	290	780	7,760	5,345	6,090
New Hampshire	2,280	1,820	260	55	2,650	2,265	2,780
Vermont	7,340	5,730	1,460	290	8,965	6,750	8,260
Massachusetts	3,290	2,070	800	105	5,365	3,215	3,650
Rhode Island	460	240	95	25	620	295	295
Connecticut	3,835	2,225	935	75	5,090	2,275	3,200
New York	63,965	36,605	17,915	24,510	70,980	43,780	50,880
New Jersey	5,620	2,190	2,190	2,245	14,790	3,665	4,200
Pennsylvania	68,095	37,900	30,870	36,785	90,160	45,150	56,400
Delaware	3,615	1,600	1,925	1,855	5,685	960	965
Maryland	15,010	7,635	7,875	8,105	25,505	8,215	10,450
NORTHEAST	**178,340**	**100,860**	**64,615**	**74,830**	**237,570**	**121,915**	**147,170**
Ohio	116,975	51,250	58,440	58,600	144,930	51,385	59,645
Indiana	116,065	45,320	59,925	47,735	123,770	37,920	46,635
Illinois	176,645	66,290	87,665	60,190	160,550	49,205	65,670
Iowa	186,545	90,470	97,475	55,840	191,295	83,170	99,095
Missouri	82,725	50,860	46,695	48,525	134,845	49,110	80,065
CORN BELT	**678,955**	**304,190**	**350,200**	**270,890**	**755,390**	**270,790**	**351,110**
Michigan	82,900	33,440	35,440	47,140	116,850	40,295	44,270
Wisconsin	130,750	76,780	62,490	60,090	149,675	84,260	95,740
Minnesota	146,465	69,460	75,225	69,675	161,440	81,485	89,120
LAKE STATES	**360,115**	**179,680**	**173,155**	**176,905**	**427,965**	**206,040**	**229,130**
North Dakota	71,020	18,900	14,020	55,145	59,215	21,250	37,665
South Dakota	63,060	26,410	28,370	31,230	59,415	21,635	43,975
Nebraska	97,710	40,465	42,360	40,025	84,330	32,870	50,875
Kansas	104,260	33,740	20,535	65,030	85,610	33,760	50,385
GREAT PLAINS	**336,050**	**119,515**	**105,285**	**191,430**	**288,570**	**109,515**	**182,900**
West Virginia	6,290	7,650	4,885	3,410	17,645	9,010	17,355
Kentucky	24,270	25,225	35,935	10,525	100,240	29,200	46,735
Tennessee	14,955	18,400	48,570	13,145	65,050	23,270	50,090
Virginia	18,490	19,685	24,185	15,860	60,405	22,180	30,565
North Carolina	20,245	19,270	68,215	21,250	58,030	15,150	31,060
APPALACHIAN	**84,250**	**90,230**	**181,790**	**64,190**	**301,370**	**98,810**	**175,805**
South Carolina	4,595	3,560	28,580	10,970	10,085	5,595	9,560
Georgia	13,740	6,030	36,330	9,460	28,670	10,080	15,925
Florida	3,645	1,085	5,575	1,640	18,585	1,830	3,630
Alabama	11,280	4,025	39,585	6,650	21,450	7,230	15,580
SOUTHEAST	**33,260**	**14,700**	**110,070**	**28,720**	**78,790**	**24,735**	**44,695**
Mississippi	7,715	4,600	49,160	7,825	27,090	9,275	20,610
Louisiana	2,520	2,650	16,585	7,000	20,265	5,990	10,400
Arkansas	9,415	6,460	20,435	12,500	44,785	10,000	19,915
DELTA STATES	**19,650**	**13,710**	**86,180**	**27,325**	**92,140**	**25,265**	**50,925**
Oklahoma	25,130	8,390	8,640	30,540	74,935	19,010	31,160
Texas	39,990	15,925	51,925	47,835	85,710	22,080	45,255
SOUTHERN PLAINS	**65,120**	**24,315**	**60,565**	**78,375**	**160,645**	**41,090**	**76,415**
Montana	27,960	9,890	1,025	20,655	26,620	13,365	20,615
Idaho	24,410	12,335	2,500	15,020	32,330	15,645	20,510
Wyoming	5,020	4,230	900	4,000	15,175	5,040	5,895
Colorado	25,150	12,590	5,845	14,925	25,415	13,760	15,125
New Mexico	2,570	2,050	2,970	1,890	8,500	4,060	4,525
Arizona	1,800	870	1,785	1,375	3,260	1,365	1,950
Utah	10,035	6,825	1,600	5,320	14,680	9,040	10,400
Nevada	940	1,005	60	310	2,470	1,445	1,500
MOUNTAIN STATES	**97,885**	**49,795**	**16,685**	**63,495**	**128,450**	**63,720**	**80,520**
Washington	21,710	13,010	1,725	16,700	35,895	13,170	19,915
Oregon	17,495	11,485	1,065	11,495	34,890	11,585	18,735
California	24,170	13,510	8,655	8,645	58,325	13,365	22,680
PACIFIC	**63,375**	**38,005**	**11,455**	**36,840**	**129,110**	**38,120**	**61,330**
TOTAL	**1,917,000**	**935,000**	**1,160,000**	**1,013,000**	**2,600,000**	**1,000,000**	**1,400,000**

*Cutter bar type only.

Principal Machines on Farms — 1987

STATE	PICK-UP BALERS			FIELD FORAGE HARVESTERS[1]			MOWER CONDITIONERS[2]		
	1978 Census Number	1982 Census Number	Estimated July 1, 1987 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1987 Number	1978 Census Number	1982 Census Number	Estimated July 1, 1987 Number
Maine	2,609	3,047	3,160	1,309	1,181	1,095	2,023	2,353	2,575
New Hampshire	1,254	1,259	1,220	545	544	520	889	960	1,020
Vermont	4,082	4,167	4,090	2,707	2,569	2,390	3,777	3,866	3,960
Massachusetts	1,732	1,704	1,535	1,092	1.083	1,045	1,472	1,533	1,590
Rhode Island	181	205	205	113	93	75	124	146	160
Connecticut	1,509	1,508	1,460	804	773	730	1,063	1,318	1,490
New York	28,853	28,078	26,850	20,298	19,040	17,810	25,390	25,603	26,010
New Jersey	2,194	2,260	2,235	1,093	1,165	1,160	2,275	2,386	2,475
Pennsylvania	37,288	37,257	36,070	18,891	18,078	16,940	29,419	29,456	29,845
Delaware	568	531	500	269	249	225	587	519	485
Maryland	5,581	5,719	5,615	2,852	2,670	2,515	4,653	5,136	5,445
NORTHEAST	**85,851**	**85,735**	**82,940**	**49,973**	**47,465**	**44,505**	**71,672**	**73,276**	**75,055**
Ohio	38,496	39,754	39,115	11,209	11,090	10,690	26,997	26,143	26,020
Indiana	23,838	23,947	23,350	6,912	6,917	6,695	15,733	15,583	15,640
Illinois	30,632	30,463	29,460	11,557	9,972	8,905	21,173	21,867	22,490
Iowa	47,389	47,776	46,800	19,393	17,638	16,260	26,375	28,401	29,895
Missouri	43,981	48,662	49,070	8,704	8,055	7,450	23,469	26,527	28,435
CORN BELT	**184,336**	**190,602**	**187,795**	**57,775**	**53,672**	**50,000**	**113,747**	**118,521**	**122,480**
Michigan	24,536	25,051	24,630	12,704	11,809	10,940	20,696	21,055	21,540
Wisconsin	58,443	58,042	56,360	43,154	43,880	42,925	51,830	51,630	52,015
Minnesota	50,165	51,038	50,055	23,341	23,803	23,260	31,714	32,050	32,615
LAKE STATES	**133,144**	**134,131**	**131,045**	**79,199**	**79,492**	**77,125**	**104,240**	**104.735**	**106,170**
North Dakota	15,180	16,628	16,850	5,538	4,839	4,455	6,315	6,181	6,160
South Dakota	14,174	17,966	19,310	11,280	10,568	9,875	5,673	6,958	7,230
Nebraska	16,968	18,906	19,510	13,870	12,538	11,520	14,740	15,497	16,165
Kansas	29,222	31,998	32,600	10,778	9,367	8,380	17,144	18,932	20,010
GREAT PLAINS	**75,544**	**85,498**	**88,270**	**41,466**	**37,312**	**34,230**	**43,872**	**47,568**	**49,565**
West Virginia	9,119	10,550	10,985	2,094	2,323	2,340	5,035	6,033	6,615
Kentucky	31,575	35,143	36,160	7,752	7,910	7,750	23,656	23,805	24,260
Tennessee	22,028	26,506	28,080	5,202	6,313	6,675	16,834	18,734	19,710
Virginia	17,932	21,805	22,760	6,075	6,209	6,050	12,404	14,659	16,165
North Carolina	12,461	12,752	12,365	4,204	3,502	2,995	10,577	10,888	11,110
APPALACHIAN	**93,115**	**106,756**	**110,350**	**25,327**	**26,257**	**25,810**	**68,506**	**74,119**	**77,860**
South Carolina	4,404	4,823	4,780	1,369	1,260	1,160	3,370	4,033	4,430
Georgia	8,671	10,407	10,935	2,652	2,717	2,660	9,176	9,465	9,695
Florida	2,787	3,754	4,120	903	861	815	6,406	7,591	8,385
Alabama	10,068	11,322	11,530	2,102	2,112	2,050	8,349	8,212	8,235
SOUTHEAST	**25,930**	**30,306**	**31,365**	**7,026**	**6,950**	**6,685**	**27,301**	**29,301**	**30,745**
Mississippi	8,286	10,509	11,280	2,003	1,927	1,835	7,294	7,949	8,395
Louisiana	5,666	6,425	6,620	1,299	1,327	1,290	6,587	6,698	6,845
Arkansas	10,783	13,994	15,275	1,882	1,634	1,450	8,366	10,035	11,070
DELTA STATES	**24,735**	**30,928**	**33,175**	**5,184**	**4,888**	**4,575**	**22,247**	**24,682**	**26,310**
Oklahoma	19,242	22,690	23,745	2,420	2,491	2,455	14,990	17,107	18,490
Texas	26,382	33,736	35,570	5,339	5,109	4,820	32,449	39,629	37,800
SOUTHERN PLAINS	**45,624**	**56,426**	**59,315**	**7,759**	**7,600**	**7,275**	**47,439**	**56,736**	**56,290**
Montana	11,692	12,468	12,540	2,086	2,429	2,510	7,304	8,102	8,580
Idaho	12,862	12,210	11,580	2,391	2,384	2,305	9,029	8,515	8,345
Wyoming	4,468	5,066	5,250	1,261	1,222	1,160	3,433	3,904	4,200
Colorado	10,374	10,365	10,050	4,355	3,503	3,005	7,259	7,040	7,025
New Mexico	3,252	3,403	3,400	774	802	795	2,317	2,395	2,475
Arizona	1,004	6,942	1,025	298	348	355	780	861	915
Utah	6,922	6,965	6,790	1,874	1,978	1,970	5,098	5,547	5,860
Nevada	1,470	1,598	1,605	353	437	465	1,245	1,314	1,375
MOUNTAIN STATES	**52,044**	**53,117**	**52,240**	**13,392**	**13,103**	**12,565**	**36,465**	**37,678**	**38,775**
Washington	8,717	9,518	9,635	2,890	3,060	3,050	8,107	9,838	10,910
Oregon	8,443	9,730	10,110	2,602	2,555	2,450	7,033	8,528	9,430
California	6,358	6,725	6,760	2,530	2,715	2,730	7,558	9,299	10,410
PACIFIC	**23,518**	**25,973**	**26,505**	**8,022**	**8,330**	**8,230**	**22,698**	**27,665**	**30,750**
TOTAL	**743,841**	**799,472**	**803,000**	**295,123**	**285,069**	**271,000**	**558,187**	**594,281**	**614,000**

[1] Shear-bar type. [2] Does not include windrowers with conditioning rolls.

Farm Wheel Tractor Retail Sales by State, 1983-1986

(In Units)

State	1983			1984			1985			1986		
	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors	2-wheel Drive	4-wheel Drive	Total Tractors
Alabama	2,325	3	2,328	2,653	10	2,663	2,872	2	2,874	3,041	—	3,041
Alaska	78	—	78	71	—	71	39	—	39	22	—	22
Arizona	619	27	646	782	30	812	1,240	29	1,269	657	16	673
Arkansas	3,582	139	3,721	3,714	91	3,805	3,683	70	3,753	3,154	55	3,209
California	5,040	214	5,254	5,946	186	6,132	4,931	74	5,005	5,138	73	5,211
Colorado	1,188	126	1,314	1,234	106	1,340	983	89	1,072	711	50	761
Connecticut	491	-2	489	618	3	621	715	1	716	937	—	937
Delaware	258	4	262	248	7	255	286	7	293	351	6	357
Florida	3,622	68	3,690	4,614	19	4,633	4,543	30	4,573	4,732	31	4,763
Georgia	3,660	6	3,666	4,655	10	4,665	5,242	5	5,247	5,077	6	5,083
Hawaii	141	—	141	116	5	121	126	9	135	142	4	146
Idaho	1,013	131	1,144	1,062	117	1,179	786	83	869	483	35	518
Illinois	4,658	433	5,091	3,958	312	4,270	3,327	252	3,579	3,182	155	3,337
Indiana	2,837	197	3,034	2,801	135	2,936	2,789	113	2,902	2,784	68	2,852
Iowa	4,149	284	4,433	2,964	129	3,093	1,894	68	1,962	2,022	69	2,091
Kansas	2,575	403	2,978	2,199	342	2,541	1,739	248	1,987	1,585	134	1,719
Kentucky	3,244	21	3,265	2,945	15	2,960	3,044	23	3,067	2,643	11	2,654
Louisiana	4,143	64	4,207	3,894	48	3,942	3,419	66	3,485	2,602	15	2,617
Maine	549	1	550	615	—	615	625	—	625	806	—	806
Maryland	1,440	17	1,457	1,683	7	1,690	2,139	3	2,142	2,081	1	2,082
Massachusetts	517	—	517	621	—	621	783	—	783	999	—	999
Michigan	2,569	143	2,712	2,751	132	2,883	2,975	74	3,049	3,051	51	3,102
Minnesota	3,029	386	3,415	2,441	295	2,736	1,714	202	1,916	1,651	183	1,834
Mississippi	2,571	31	2,602	3,030	25	3,055	3,172	20	3,192	2,516	7	2,523
Missouri	3,086	118	3,204	3,036	75	3,111	3,159	35	3,194	3,290	38	3,328
Montana	861	260	1,121	677	195	872	602	122	724	323	103	476
Nebraska	2,121	168	2,289	1,598	99	1,697	963	63	1,026	1,258	66	1,324
Nevada	79	4	83	82	6	88	113	4	117	102	2	104
New Hampshire	505	—	505	712	1	713	946	—	946	1,139	—	1,139
New Jersey	781	1	782	1,039	1	1,040	1,062	1	1,063	1,275	—	1,275
New Mexico	421	12	433	371	19	390	529	18	547	418	9	427
New York	2,825	54	2,879	3,296	45	3,341	3,717	21	3,738	4,065	24	4,089
North Carolina	4,072	12	4,084	4,571	12	4,583	4,478	9	4,487	4,511	7	4,518
North Dakota	1,354	491	1,845	1,112	457	1,569	917	351	1,268	892	292	1,184
Ohio	3,475	128	3,603	3,887	108	3,995	4,537	56	4,593	4,364	67	4,431
Oklahoma	2,557	218	2,775	2,364	213	2,577	2,203	167	2,370	1,899	82	1,981
Oregon	1,601	56	1,657	1,705	41	1,746	1,606	36	1,642	1,699	24	1,723
Pennsylvania	3,425	24	3,449	3,717	21	3,738	4,095	16	4,111	4,524	15	4,539
Rhode Island	64	—	64	85	—	85	97	—	97	117	—	117
South Carolina	1,524	10	1,534	1,904	2	1,906	2,171	5	2,176	2,033	1	2,034
South Dakota	1,230	221	1,451	1,060	169	1,229	809	158	967	934	149	1,083
Tennessee	3,803	20	3,823	3,936	15	3,951	4,522	16	4,538	4,207	13	4,220
Texas	13,786	308	14,094	12,338	226	12,564	13,252	192	13,444	9,849	77	9,926
Utah	655	21	676	688	15	703	625	6	631	480	4	484
Vermont	414	1	415	509	5	514	600	2	602	625	—	625
Virginia	2,677	6	2,683	2,736	5	2,741	3,253	5	3,258	3,309	6	3,315
Washington	1,951	125	2,076	1,956	105	2,061	1,652	83	1,735	1,450	39	1,489
West Virginia	480	1	481	525	1	526	685	—	685	925	1	926
Wisconsin	2,907	115	3,022	2,821	82	2,903	2,615	60	2,675	2,225	41	2,266
Wyoming	277	25	302	302	26	328	168	18	186	149	7	156
U.S. Govt.	4	1	5	530	—	530	13	—	13	29	—	29
Miscellaneous	605	3	608	590	3	593	306	—	306	250	—	250
TOTAL	**111,838**	**5,099**	**116,937**	**113,759**	**3,975**	**117,734**	**112,761**	**2,912**	**115,673**	**106,758**	**2,037**	**108,795**

Source: Farm & Industrial Equipment Institute. Figures do not include garden tractors, motor tillers or contractor's off-highway types.

Notebook *(from pg. 8)*

and you'll find some things that will interest you. If you don't, you're in another business and I don't know how you got hold of a copy of I&T.

Export and import numbers interest me a great deal. They show, for instance, how the world and our part of it changes in many ways. Sample: As recently as 1984, Nicaragua was importing over $7 million in U.S. farm equipment. Today, according to Commerce Department data, it's *zip*. Not even on the computer. Libya took almost $20 million in 1985, just over $1 million last year and nothing so far this year.

However, most of the United States' declining track record in farm equipment exports is attributable to difficult times for agriculture throughout the world and the strength of the dollar. True, the dollar has declined substantially in the past two years, but it takes a long time to see such a change reflected in exports of equipment.

Australia was a huge customer in 1984, buying $214 million worth of farm machinery. But by last year, mainly because of Australia's farm economy problems, the level was down to $47 million and probably will be lower at the end of this year.

And so as of June 30, 1987, the United States had exported $802 million for the year, down $34 million from the first half of 1986. Imports were $916 million, up $39 million

Retail Sales of Selected Farm Equipment — Jan.-Dec., 1985 and 1986[1]

(In Units)

STATE	COMBINES SELF-PROPELLED		CORN HEADS		HAY BALERS[2]		WINDROWERS SELF-PROPELLED				GRINDER-MIXERS		SHEAR-BAR FORAGE HARVESTERS[3]		MOWER CONDITIONERS ALL-TYPES	
							POWER UNITS		TOTAL HEADS							
	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986
Alabama	59	14	24	7	86	78	—	2	—	2	41	28	11	6	88	108
Alaska	—	1	—	—	7	—	—	—	—	—	—	—	—	—	5	—
Arizona	26	13	1	1	27	22	50	30	55	35	1	2	4	4	5	4
Arkansas	181	184	5	8	168	110	—	2	—	2	28	10	2	—	216	222
California	62	60	22	21	99	85	178	153	204	166	1	1	45	52	30	54
Colorado	109	90	34	43	229	141	103	61	120	70	12	9	21	12	110	80
Connecticut	—	—	—	—	26	27	—	—	—	—	1	—	19	17	48	57
Delaware	28	7	22	13	12	6	1	—	1	—	8	—	1	3	12	11
Florida	16	5	5	2	78	62	1	—	2	—	5	3	17	6	54	54
Georgia	149	33	78	33	136	100	—	—	—	1	39	29	27	7	125	103
Hawaii	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
Idaho	112	71	3	1	200	140	108	73	139	93	3	—	14	7	60	50
Illinois	1,086	1,120	1,062	986	143	105	3	3	3	3	129	176	49	46	325	302
Indiana	613	602	650	526	166	143	2	—	2	1	113	133	45	27	350	341
Iowa	635	854	640	819	80	127	15	30	16	29	180	295	46	67	252	429
Kansas	595	484	84	63	124	73	124	64	140	82	34	35	36	19	263	124
Kentucky	109	63	89	40	201	141	—	—	—	—	78	61	47	32	616	518
Louisiana	71	32	12	10	90	58	—	—	—	—	7	4	6	5	38	47
Maine	—	—	—	—	53	31	2	—	2	—	—	—	28	18	71	129
Maryland	90	53	82	49	83	66	6	6	6	6	22	6	34	34	129	100
Massachusetts	—	—	—	—	27	31	—	1	—	1	—	—	28	15	68	55
Michigan	127	144	133	123	187	197	24	13	22	18	87	77	132	112	329	363
Minnesota	417	462	268	295	214	308	95	56	101	65	97	137	159	153	387	595
Mississippi	93	86	1	—	47	38	—	—	—	—	19	9	16	6	35	52
Missouri	397	397	157	173	255	166	11	8	12	10	71	71	29	23	628	541
Montana	120	163	1	—	88	113	88	94	115	119	17	4	24	17	63	84
Nebraska	489	603	372	426	42	43	45	35	61	54	59	80	37	65	131	223
Nevada	1	—	—	—	26	22	31	20	37	26	2	—	10	3	14	13
New Hampshire	—	—	—	—	40	31	—	—	—	—	1	—	15	16	57	107
New Jersey	6	4	8	—	32	25	—	—	—	—	3	9	4	8	43	21
New Mexico	23	10	2	4	124	94	50	26	52	28	2	1	6	4	35	25
New York	35	29	51	36	391	287	29	14	25	17	35	25	291	221	659	675
North Carolina	127	98	117	107	155	157	—	—	—	—	26	19	56	34	264	302
North Dakota	459	433	31	20	9	16	182	95	198	130	51	30	36	44	79	124
Ohio	438	479	369	364	307	247	11	13	11	13	118	129	100	84	646	480
Oklahoma	235	71	21	13	330	110	69	21	82	22	31	11	10	4	450	229
Oregon	85	40	8	3	159	143	94	60	115	93	6	2	21	16	95	92
Pennsylvania	95	109	101	95	468	352	26	17	26	38	147	98	206	173	717	635
Rhode Island	—	—	—	—	4	2	—	—	—	—	—	—	—	—	2	2
South Carolina	48	26	53	15	45	41	1	—	1	—	15	7	12	4	78	86
South Dakota	283	278	106	130	24	34	98	96	118	106	72	79	59	63	44	181
Tennessee	114	53	28	22	198	160	—	—	—	—	93	35	41	32	482	431
Texas	466	206	112	61	756	396	55	23	63	26	81	53	30	21	1,142	611
Utah	18	7	3	1	137	113	47	51	52	54	4	4	26	23	95	97
Vermont	—	1	—	1	58	45	6	2	7	3	—	—	53	61	137	166
Virginia	72	30	51	23	141	126	1	2	1	2	39	23	69	66	485	427
Washington	141	59	12	8	167	158	61	50	57	74	-1	4	40	17	95	82
West Virginia	—	1	—	1	68	59	—	—	—	—	10	9	17	14	114	87
Wisconsin	161	176	198	173	461	632	66	79	71	85	117	88	474	498	1,018	1,324
Wyoming	20	7	—	—	65	67	35	35	43	43	10	1	5	4	30	31
U.S. Govt.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Miscellaneous[4]	—	—	—	—	5	6	—	—	—	—	—	—	2	1	24	24
TOTAL	8,411	7,660	5,016	4,716	7,038	5,734	1,713	1,255	1,961	1,518	1,914	1,797	2,460	2,164	11,243	10,898

Source: Farm & Industrial Equipment Institute.

[1] Includes revisions for prior months.

[2] For making bales of under 200 lbs.

[3] Pull-type, mounted, self-propelled.

[4] Sales reported as miscellaneous are retail sales which cannot be classified by state or as U.S. Government. They include sales and dispositions that do not go through usual marketing channels such as gifts to non-profit organizations, intra-plant or company transfers, etc.

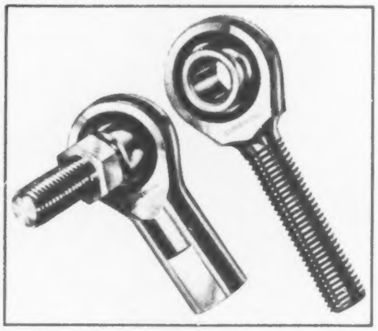
from a year earlier. It's a negative farm equipment trade balance of $114 million.

I think that the picture will improve in a few years, but the United States will probably not produce a favorable balance of farm equipment trade for the foreseeable future.

For one thing, the major manufacturers have committed themselves to supplying their U.S. markets with products to a large extent made in Western Europe. They also are sourcing more components over there and thus cutting down their U.S. exports of tractor and equipment parts. They say that this is the most economical way to go.

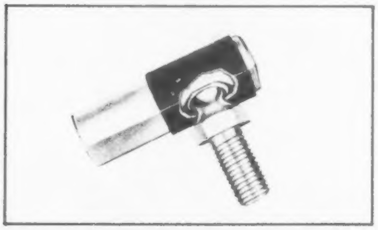
(advertisement)

CONCEPTS IN MOTION TRANSMISSION



High Wear-Resistance Rod Ends

Patented Superior process produces rod ends that provide high wear resistance in demanding applications . . . . at a significant saving. Locks in lubricated raceways of fiberglass reinforced nylon, providing maximum contact with precision hardened steel balls, creating free movement with minimum play. Available in both male and female designs, left and right hand thread styles. Sizes from #10-32 through ¾-16, with and without mounting studs. All units plated and dichromate treated for exceptional corrosion resistance. **Tuthill Corporation, Superior Linkage Division, 2110 Summit Street, New Haven, Indiana 46774.**



Type SPG Ball Joints With Alignment Guide

Type SPC patented ball joint, designed for heavy duty service, has "flat top" alignment guide which makes it easy to align ball stud in vertical position to provide maximum movement in all directions, facilitates torquing of lock nuts. Ball joints swivel in 38° minimum cone. Thread sizes from #10-32 through ½-20. Includes Buna-N rubber dirt shield. Ball cavities packed with Lubriplate. Ball studs case hardened steel. Plated and dichromate treated for exceptional corrosion resistance. **Tuthill Corporation, Superior Linkage Division, 2110 Summit Street, New Haven, Indiana 46774.**

Write in (10) on Reply Card

Value of U.S. Farm Equipment Exports by Countries of Destination

(Value in Thousands of Dollars)

Country	1984	1985	1986	Jan.-June 1987
Western Hemisphere				
Canada	$891,074	$791,762	$649,405	$384,078
Mexico	113,912	214,838	76,496	28,953
Guatemala	3,610	3,719	5,034	1,776
Honduras	5,890	3,884	3,486	1,986
Nicaragua	7,296	5,103	—	—
El Salvador	3,661	2,397	2,471	771
Costa Rica	6,306	5,073	3,718	1,453
Panama	2,704	3,396	5,057	3,343
Trinidad	2,544	2,410	1,979	931
Dominican Republic	5,545	4,934	11,925	7,497
Colombia	16,191	11,989	12,349	8,469
Jamaica	4,398	3,210	2,537	1,430
Venezuela	23,904	43,193	54,116	18,639
Brazil	16,423	17,707	18,447	10,936
Argentina	10,136	5,283	4,695	11,977
Bolivia	3,636	3,382	3,127	1,489
Chile	5,581	7,385	5,638	3,211
Ecuador	6,858	11,056	11,044	3,861
Peru	7,052	4,079	6,131	2,488
Europe				
Denmark	2,467	1,983	2,933	3,165
Sweden	9,066	3,445	3,366	3,954
United Kingdom	68,267	53,285	53,344	32,510
Netherlands	7,586	6,850	12,463	5,976
Belgium	53,832	23,595	40,770	24,306
France	89,374	60,232	68,371	50,117
West Germany	67,436	56,817	51,695	23,089
Hungary	10,955	12,741	13,151	4,195
Switzerland	3,204	2,441	2,701	1,443
Spain	10,986	9,760	20,838	7,150
Italy	8,610	7,572	13,150	6,764
Yugoslavia	1,532	2,893	2,924	922
Greece	22,295	18,094	5,045	1,121
U.S.S.R.	12,546	15,622	10,673	274
Middle East				
Israel	16,958	13,844	7,459	3,881
Kuwait	1,691	3,099	2,681	920
Saudi Arabia	257,307	96,269	73,559	39,432
Iraq	2,136	5,321	2,170	110
Turkey	NA	NA	3,534	3,052
Asia and Pacific				
India	2,959	801	1,774	743
Singapore	13,100	4,315	5,264	3,770
Indonesia	3,795	936	1,754	789
China (Taiwan)	2,296	2,635	2,727	1,698
China (P.R.C.)	16,894	6,545	11,950	2,805
Philippines	4,045	1,967	2,297	1,221
Korea	5,236	3,294	2,706	1,813
Japan	20,196	17,458	18,876	11,072
Australia	214,075	141,506	47,670	18,990
New Zealand	5,293	3,723	2,706	773
Africa				
Algeria	5,133	4,418	6,168	2,842
Libya	19,687	14,819	1,196	—
Sudan	4,498	2,163	3,811	2,787
Nigeria	2,538	5,856	5,967	1,682
Egypt	11,436	22,510	15,876	3,725
Rep. South Africa	59,537	29,370	25,011	12,515
Zimbabwe	1,643	2,904	1,181	592
Total U.S. Exports, Farm & Industrial Equipment	**$2,235,014**	**$1,854,772**	**$1,466,690**	**$801,683**

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.

Farm Equipment Exports by Type of Product

Product	Jan.-Dec. 1985		Jan.-Dec. 1986		Jan.-June 1987	
	Quantity	Dollar Value in Thousands	Quantity	Dollar Value in Thousands	Quantity	Dollar Value in Thousands
Combines, pull-type	829	$13,423	1,208	25,192	1,179	25,475
Combines, self-propelled	3,942	170,229	3,729	126,771	2,215	84,233
Cultivators, tractor-drawn or mounted	2,177	5,876	1,323	2,972	551	1,475
Cultivators, NEC, and Weeders	3,571	6,052	1,254	3,504	2,066	2,420
Farm Elevators and Blowers	1,766	5,770	1,877	3,847	721	1,632
Farm Wagons and Carts	833	2,021	1,877	3,847	466	927
Parts for Farm Wagons and Carts	—	897	—	701	—	393
Fertilizing Machines	4,580	13,820	6,375	13,831	2,355	4,073
Forage Harvesters	1,655	19,861	1,125	20,863	568	12,694
Harrows, Disk	1,681	7,768	866	3,111	491	1,667
Harrows, NEC, & Soil Pulverizers	4,266	4,764	3,014	3,505	2,066	2,686
Parts for Harrows, Stalk Cutters & Soil Pulverizers	—	9,292	—	3,745	—	2,436
Harvesting Machines, NEC	5,329	75,125	3,858	43,489	2,395	16,864
Harvesting Machine Parts	—	129,487	—	123,102	—	62,441
Hay Balers	4,387	32,563	4,311	31,340	3,477	26,446
Haying Machines, NEC (incl. rakes & tedders)	2,722	17,083	2,121	14,367	1,228	8,682
Parts for Haying Machines	—	14,845	—	12,766	—	9,098
Mowers, Cutterbar, tractor-drawn	1,400	2,895	1,475	3,138	383	1,637
Mowers, Rotary, tractor-drawn (excl. lawn mowers)	7,481	5,691	9,395	6,210	8,270	4,346
Mowers, NEC, tractor-drawn (excl. lawn mowers)	2,372	6,647	1,686	5,188	768	4,322
Planting Machines	3,340	7,816	1,799	7,342	1,264	4,855
Plows, Disk	853	2,357	672	1,418	325	739
Plows, Moldboard	1,654	5,351	480	1,765	579	1,754
Plows & Listers, NEC	3,272	9,055	2,486	6,627	2,323	3,084
Parts for Plows, Listers, Cultivators & Weeders	—	9,184	—	8,118	—	5,827
Seeding Machines	8,599	18,709	7,267	14,862	3,264	6,778
Parts for Planting, Seeding & Fertilizing Machines	—	13,479	—	11,888	—	4,466
Farm Tractors:						
Under 40 PTO HP	669	3,521	841	4,403	436	2,381
40-59 PTO HP	798	8,536	570	5,682	284	2,829
60-79 PTO HP	818	12,279	453	6,815	149	2,046
80-99 PTO HP	1,164	23,580	490	9,913	263	6,249
100-119 PTO HP	760	22,200	536	18,136	126	4,250
120-139 PTO HP	1,741	60,801	849	29,213	293	10,936
140-159 PTO HP	1,264	47,619	751	27,120	163	5,683
160-179 PTO HP	1,409	63,625	1,072	45,451	472	22,720
180 HP & Over	1,793	119,052	1,175	75,166	499	30,994
Other Farm Tractors	1,157	23,815	1,525	21,961	1,752	13,069
Parts for Farm Tractors	—	566,941	—	454,098	—	259,208

Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.
NEC — Not elsewhere counted or classified.

FOR YOUR INFORMATION

Marathon Electric Mfg. Corp. has a brochure describing its electrical motors for agricultural applications. Single-phase motors described include chore motors, drip proof crop dryer motors, fan motors for high-pressure grain drying and vacuum pump motors. A Marathon innovation, PowerSwitch, which provides extra starting power for single phase motors, is also described. Marathon Electric Mfg. Corp., Lead Inquiry Services, Box 633, Elm Grove, Wis. 53122.

* * *

OMC Lincoln Service Dept. has produced the "Cushman Tune-Up Book" which covers OMC 18-22 hp gas engines used in the Cushman Front Line mower, the Turf-Truckster vehicle and the Haulster vehicle. Service Dept., OMC Lincoln, P.O. Box 82409, Lincoln, Neb. 68501.

Homestead Industries, Inc. has an eight-page brochure listing its line of Jenny hot and cold pressure washers, steam cleaners and combination units. Homestead Industries, Inc., P.O. Box 348, Coraopolis, Pa. 15108.

* * *

Homelite Div. of Textron, Inc., has a 52-page industrial products catalog that covers its water pumps, generators, chain saws, brushcutters, snow throwers, commercial mowers and tractors. Sales Dept., Homelite Div. of Textron, Inc., Box 7047, Charlotte, N.C. 28217.

Shindaiwa Inc. describes in a 16-page booklet its complete line of outdoor power equipment, including chain saws, grass trimmers, brushcutters, pumps, blowers and generators. Ask for catalog 50241-6. Shindaiwa, Inc., Box 1090, Tualatin, Ore. 97062.

* * *

Rust-Oleum Corp. describes in a new bulletin its 78[illegible] Rust Reformer coating, which it claims transforms rust into an inert, non-corrosive black coating. John Ernst, Rust-Oleum Corp., 11 Hawthorn Parkway, Vernon Hills, Ill. 60061.

Dollar Value of Farm Equipment Imports by Country of Origin, Jan. 1982-June 1987

(In Thousands)

Country	Jan.-Dec. 1982	Jan.-Dec. 1983	Jan.-Dec. 1984	Jan.-Dec. 1985	Jan.-Dec. 1986	Jan.-June 1987
Canada	$487,286	$453,551	$576,583	$415,527	$366,074	$227,144
Mexico	11,349	18,563	10,099	8,159	6,218	6,036
Brazil	4,780	6,424	11,395	12,214	10,967	7,942
Sweden	3,023	2,873	4,002	3,464	4,538	2,997
Denmark	4,910	5,856	7,670	9,331	7,290	4,629
Netherlands	13,924	32,831	46,912	33,945	29,778	15,356
United Kingdom	93,806	163,678	217,201	207,020	234,406	111,752
Belgium	25,730	23,691	27,697	29,389	42,537	26,555
France	30,804	41,333	72,605	68,681	64,556	32,084
West Germany	169,087	248,015	223,651	222,756	252,740	128,920
Hungary	7,564	2,404	11,665	5,444	1,816	1,981
Czechoslovakia	1,113	1,892	5,886	5,926	6,197	1,344
Romania	15,461	6,088	4,701	4,409	1,921	3,779
Italy	95,092	99,219	152,409	122,300	118,808	66,602
Spain	6,541	2,946	7,124	3,996	5,978	3,115
Israel	2,677	2,988	4,183	7,619	7,475	4,552
New Zealand	9,792	11,885	11,220	10,725	8,123	5,138
Australia	4,662	3,209	4,568	5,421	5,941	2,774
Japan	181,056	204,818	309,757	355,577	418,780	238,599
China (Taiwan)	2,913	3,617	5,175	5,132	6,066	3,307
China (P.R.C.)	1,381	1,949	3,113	2,568	3,002	2,663
Korea	NA	852	742	1,256	5,667	4,787
U.S.S.R.	NA	1,255	852	1,266	3,731	716
TOTAL	$1,179,734	$1,347,483	$1,729,402	$1,557,623	$1,630,628	$916,352

Source: U.S. Dept. of Commerce. International Trade Administration. Office of Capital Goods and International Construction.

Imports of Farm Equipment by Product

Product	Jan.-Dec. 1985 Quantity	Jan.-Dec. 1985 Value in Thousands of Dollars	Jan.-Dec. 1986 Quantity	Jan.-Dec. 1986 Value in Thousands of Dollars	Jan.-June 1987 Quantity	Jan.-June 1987 Value in Thousands of Dollars
Knives & Cutting Blades	11,710,518	$ 10,240	8,741,126	$ 8,202	4,780,233	$ 4,905
Plows & Listers	2,555	2,700	3,363	7,962	2,613	6,486
Cultivators & Weeders	19,075	14,198	32,017	25,127	13,448	14,188
Parts of Plows, Cultivators, Weeders & Listers	—	29,840	—	23,536	—	14,801
Harrows, Rollers, Stalk Cutters, Soil Pulverizers	32,375	10,844	32,442	16,987	15,023	13,216
Parts of Harrows, Rollers, Stalk Cutters, etc.	—	13,531	—	12,157	—	11,394
Planting, Seeding & Fertilizing Machinery	39,976	23,633	30,288	24,074	17,323	14,797
Parts of Planting, Seeding & Fertilizing Machinery	—	9,101	—	9,858	—	6,419
Haying Machinery other than Mowers	7,661	10,426	5,347	10,588	4,686	6,357
Mowers except Lawn Mowers	17,140	29,906	19,060	30,191	12,778	20,710
Harvesting Machines, NES	10,312	75,217	6,858	47,808	3,788	28,755
Parts of Harvesting Machines	—	56,216	—	57,807	—	30,636
Farm Wagons & Carts	4,571	4,368	3,455	3,345	2,368	2,314
Agricultural Machines & Implements, NES	—	131,945	—	143,876	—	80,943
Parts of Agricultural Machines, NES	—	78,377	—	82,488	—	64,328
Tractors, Agricultural, Wheel-Type, New, excluding Industrial*	126,959	718,163	127,964	807,047	76,070	421,680
Tractors, Agri., Used	6,605	41,883	4,110	28,367	2,232	13,976
Parts for Agri. Tractors	—	285,290	—	278,482	—	150,402
Walk-Behind Rotary Tillers	3,889	1,765	16,035	2,470	9,178	2,428

Source: U.S. Dept. of Commerce. International Trade Administration. Office of Capital Goods and International Construction.

NES - Not elsewhere specified.

*Use of the term "industrial" here is understood to refer to such machines as forklifts but not to industrial tractors as commonly defined in the farm and industrial equipment industry.

New Agricultural Tractor Imports, Jan. 1984-June 1987

(In Units)

		Under 40 HP*	40-79 HP*	80-99 HP*	100HP and Over*	HP Not Specifically Provided*	Not Elsewhere Specified, Excluding Industrial, Including Garden Types**	Totals
Jan.-June 1987	Belgium	—	71	—	400	—	2	473
	Canada	48	7	51	649	24	101	880
	Czechoslovakia	—	—	—	1	275	—	276
	France	8	25	68	1	6	11	119
	Italy	19	62	—	—	13	2,846	2,940
	Japan	32,466	4,575	1	53	463	16,013	53,571
	Korea	415	—	—	—	—	116	531
	Romania	114	913	—	—	—	1	1,028
	U.S.S.R.	166	59	14	—	—	—	239
	United Kingdom	2,274	7,161	680	171	70	68	10,424
	West Germany	464	3,001	279	44	7	603	4,398
	Yugoslavia	149	342	—	—	—	165	656
	Totals	36,242	16,429	1,097	1,343	867	20,087	76,070
1986	Belgium	26	67	29	543	—	2	667
	Canada	134	41	57	728	35	542	1,537
	Czechoslovakia	—	306	—	—	541	44	891
	France	27	85	60	191	2	19	384
	Italy	102	1,189	113	41	5	3,849	5,299
	Japan	52,000	15,282	134	1,850	679	12,648	82,593
	Korea	527	8	—	—	—	—	535
	Romania	29	321	—	—	145	—	495
	U.S.S.R.	626	463	114	10	—	1	1,214
	United Kingdom	4,846	16,396	1,387	21	216	214	23,080
	West Germany	266	8,417	1,220	80	30	225	10,238
	Yugoslavia	6	195	—	—	—	3	204
	Totals	58,746	43,121	3,182	3,475	1,663	17,777	127,964
1985	Canada	118	66	94	637	786	589	2,290
	France	138	360	193	255	4	42	992
	Italy	267	1,501	143	205	20	1,105	3,241
	Japan	58,807	13,306	75	76	233	16,331	88,828
	United Kingdom	5,362	11,028	1,220	565	101	137	18,413
	West Germany	999	6,639	1,513	473	119	140	9,883
	Totals	66,600	34,392	3,318	2,301	1,830	18,518	126,959
1984	Canada	56	74	145	899	1,539	985	3,698
	France	2	213	223	755	5	74	1,272
	Italy	141	1,836	432	329	1	496	3,235
	Japan	50,723	9,347	192	122	298	18,591	79,273
	United Kingdom	4,955	16,166	2,304	1,498	72	330	25,325
	West Germany	124	5,333	2,113	537	18	46	8,171
	Totals	56,782	35,428	5,626	4,195	2,207	20,642	124,880

Others in 1985: Czechoslovakia - 591; U.S.S.R. - 406; Netherlands - 389; Belgium - 157.
Source: U.S. Dept. of Commerce, International Trade Admin., Office of Capital Goods and International Construction.
*Excluding garden tractors. **Including garden tractors and rototillers.

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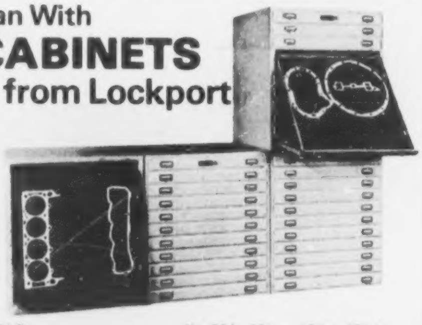

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CHANGES

Farm Fans, Inc., Indianapolis, Ind., has named Larry P. McFarland as director of North American sales. He was previously manager, sales planning and development.

* * *

Herbert P. Culp, president and owner of Friend Mfg. Corp., Gasport, N.Y., died Sept. 1 at Buffalo, N.Y. His company manufactures sprayers.

* * *

Gandy Co., Owatonna, Minn., has named Mike Hohn as eastern regional sales manager and Jeff Miedema as western sales manager. Both report to Robert L. Aamlid, national product manager.

* * *

Perkins North America is relocating its headquarters from Wayne, Mich., to Lawrenceville, Ga., an Atlanta suburb. The 130,000-square-feet facility will accommodate sales, marketing, research and product development, service and other operations.

* * *

Robert J. Hill is new product manager for tractors at Kubota Tractor Corp., Compton, Calif., responsible for managing sales and marketing activities for the tractor line. He was formerly with Deutz-Allis Corp.

* * *

Vaporamatic Co. Ltd., Sowton, Exeter, U.K., has named Martin Mountstevens as worldwide sales manager. The company markets tractor replacement parts.

* * *

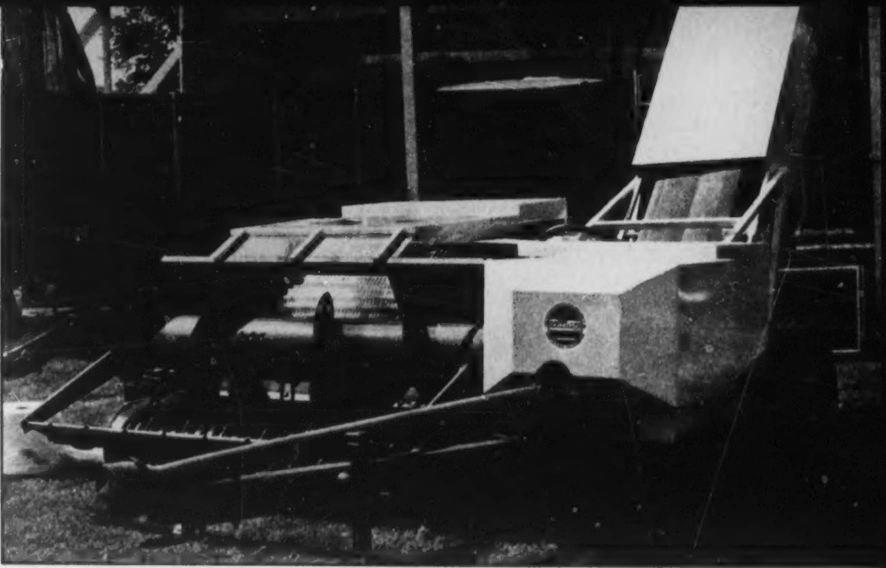
Briggs & Stratton Corp., Milwaukee, Wis., has completed production of its one-millionth twin cylinder air-cooled engine.

* * *

Gene Hemphill is new manager of North American public affairs for Ford New Holland, Inc., reporting to John Ochs, director of public affairs.

* * *

Tom Stadtmueller, Deutz-Allis marketing manager for Gleaner combines, has taken on the added duties of implement and hay tool marketing manager. He remains at the Gleaner Works in Independence, Mo.



PROTOTYPE forage harvester, designed to give high output from a 60-hp tractor, was shown by Agriculture and Food Research Council. Since much of the power used by conventional forage harvesters is in the cutting mechanism, this power-saving unit feeds material to a row of circular knives which have adjustable spacing to control length of cut. Field studies have shown reduction of power requirements by up to 40 percent. A high-speed moving belt elevator rather than a blower carries chopped material into a trailer.

U.K.'s Royal: Bright Ideas for a Gloomy Market

By Michael Williams

THE 1987 Royal Show, Britain's summer farm equipment showcase, opened to the accompaniment of gloomy statistics from the tractor industry. Sales in the first half of the year were 9,443 units, down 12 percent.

Market share data from the Agricultural Engineers Assn. shows that Ford is the top-selling make in Britain, for the 13th straight year, followed by Case IH, which has pushed past Massey-Ferguson. John Deere is fourth. Between them the big four have 75 percent of the market, leaving the other 25 or so makes to fight for the rest of it.

Tractor Market Shares in Britain

Make	1987 (Jan-June)	1986
Ford	25.0	24.4
Massey-Ferguson	16.6	20.1
Case-IH	22.4	18.4
John Deere	13.7	13.3
Deutz	2.9	3.6
Renault	2.4	3.6
Fiat	2.3	2.9
SAME	1.2	1.7
Mercedes-Benz	0.8	1.1
Others	12.6	10.9

In the face of this, at least three imports have pulled out — Switzerland's Hurlimann, part of the Italian SAME group; Poland's Ursus range; and Yugoslavia's Torpedo, based on a Deutz design.

But even down markets have up spots. One is equipment for use with all-terrain vehicles: Sprayers, fertilizer spreaders, trailers and grass cutters, for example.

And down markets often present new approaches. One seen at the Royal was a build-it-yourself manure spreader range that saves the buyer about $800 if he takes a kit of parts on a pallet.

Another idea shown was a prototype forage harvester developed by the Engineering Centre of the Agriculture and Food Research Council at Silsoe, Bedford, designed to cut the power needed to cut grass.

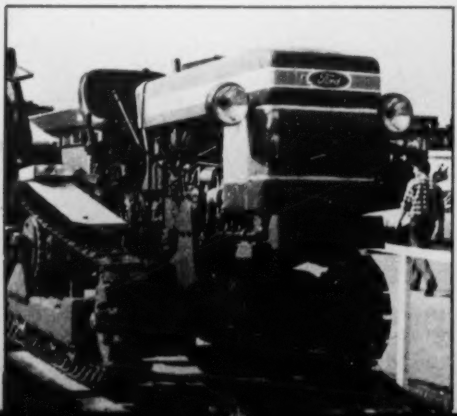
SANDERSON TELEPORTER 2 11-30 features a hydraulic ram over the front axle that levels that machine up to 12 degrees either way over uneven ground. Four-wheel drive is standard. The three-stage lifting arm will raise three tons 11 meters. No list price.

MARSHALL 264
MARSHALL
184

Above left: *AN ALL-WEATHER CAB for all-terrain vehicles, offered by Logic, is priced at $832 (wiper extra). It is not designed to give rollover protection.* **Right:** *MARSHALL, the British tractor maker acquired by Bentall-Simplex last year, is offering compacts. The 184 (18 hp) sells for $7,500 and the 264 (26 hp) for $8,128. Both have Ruggerini diesel engines.*

Above left: *CHAVIOT 931 can carry a 2500-liter sprayer or 2.5-ton fertilizer spreader. Driven by an 85-hp diesel, it comes with a 12-meter boom (at $39,200) or an optional 24-meter boom.* **Center:** *MARTIN MARKHAM tank-type manure spreader comes as a build-it-yourself kit on pallet. Kit price is listed at $2,080; complete, it's $2,880.* **Right:** *KUBOTA showed this L2850 with a reversible driving seat, steering and foot controls. Hand controls are positioned at the side and are accessible both ways. List price not yet available.*

Below: *INTERMEC designed this crawler conversion of a Ford 1210 compact, made by Shibaura. Tracks are 170 or 300 mm wide; conversion price is $4,800 or $5,600, depending on tracks.* **Right:** *FARMKING tractor by Quintade, aimed at export markets, has a 22.5-hp Lister diesel engine and a three-speed gearbox that develops a road speed of 16.5 mph. Export list price: $7,970.*



DONCASTER
FARMKING
FARMKING

August Sales: More Big Tractor Increases

Sales of big, two-wheel-drive tractors took another jump in August, according to the flash report of the Farm & Industrial Equipment Institute. It was the second straight rise, after very slow movement in the first six months of 1987. Much of the increase is believed to come from Case IH's efforts to clear out old inventory of over-100-hp, two-wheel-drive units. The company will begin producing its Magnum line (130-195 hp) in November.

Unit Retail Sales

	August			January-August		
Equipment	**1987**	**1986**	**% Change**	**1987**	**1986**	**% Change**
Farm Wheel Tractors:						
2-Wheel Drive						
Under 40 hp	4,367	4,346	.5	43,850	44,791	(2.1)
40 & Under 100 hp	2,202	2,194	.4	20,049	20,735	(3.3)
100 & Under 140 hp	907	205	342.4	2,846	3,608	(21.2)
140 hp & Over	2,054	232	785.3	5,754	6,563	(12.3)
Total 2-Wheel Drive	**9,530**	**6,977**	**36.6**	**72,499**	**75,697**	**(4.2)**
4-Wheel Drive						
Under 200 hp	22	13	69.2	304	357	(14.8)
200 hp & Over	66	54	22.2	556	841	(33.9)
Total 4-Wheel Drive	**88**	**67**	**31.3**	**860**	**1,198**	**(28.2)**
Total Farm Wheel Tractors	9,618	7,044	36.5	73,359	76,895	(4.6)
Combines (Self-Propelled)	741	1,657	(55.3)	2,498	4,196	(40.5)
Balers (Bales under 200 lbs)	585	756	(22.6)	4,306	4,477	(3.8)
Forage Harvesters (Shear Bar Type)	235	212	10.8	1,329	1,116	19.1
Mower Conditioners	954	1,101	(13.4)	8,927	8,241	8.3

These data are, in part, estimates which are subject to revisions when final detail data become available. Because of the seasonal nature of the industry, comparisons of monthly data from one period to another should be done with extreme caution. These data represent most, but not all of the manufacturers in each product category being sold at retail in the 50 states and the District of Columbia.

Mahindra Setting Up Network To Import Tractor

Mahindra Equipment Corp. has opened its North American office in Houston, Texas, and is in the process of establishing a nationwide dealer network to sell and service low-priced Mahindra tractors imported from India.

Mahindra made tractors for International Harvester in India until Case bought out IH. Now Mahindra Equipment Corp. is marketing three models under its own name in the United States and Canada.

The Mahindra tractors are available in 35 hp for less than $7,600, 45 hp for less than $8,000, and 50 hp for less than $8,400.

Briefly...

A proposed merger between the Construction Industry Manufacturers Assn. and the Farm & Industrial Equipment Institute has been voted down by CIMA's board. Talks and committee work had been going on for two years.

Case-Hesston Venture: Miller Is Manager

Charles H. Miller is general manager of the newly formed hay tool manufacturing joint venture of Case IH and Hesston Corp. A production executive for Case since 1970, he will be responsible for manufacturing operations at the Hesston, Kan., plant.

Jerome Green, Case president, said at an Aug. 28 press conference that Case has an option to increase its ownership of the joint venture "based on our take," to as much as full ownership.

Hesston: Losses Down, Volume Improved

For the first half of fiscal 1987, ended June 30, Hesston sales rose to $69.3 million from $54.3 million a year earlier, while losses declined from $23 million to $20.3 million. In the second quarter, sales were $47.4 million, compared with 1986's second quarter volume of $35.8 million, and losses declined from $9.3 million to $6.8 million.

Stockholders' equity as of June 30, using the LIFO method of inventory costing, declined further to a deficit of $38.6 million.

Employees Purchase Badger Northland, Inc.

Badger Northland, Inc., Kaukauna, Wis., has been bought by Badger employees and local investors from British Tire & Rubber, Inc. Kaukauna Investment, Inc., a group of 12 local investors and Badger officers, bought the firm June 30. As part of the buyout, employees will purchase stock in the company under an employee stock ownership plan.

Murray Thorndycraft continues as Badger's president. Kenneth Myers is executive vice president and treasurer.

The company manufactures forage, feed and manure handling equipment.